NAVAL WEAPONS INDUSTRIAL RESERVE PLANT McGREGOR, TEXAS HAZARD RANKING SYSTEM FINAL SCORING BOOK I

COMPREHENSIVE LONGTERM ENVIRONMENTAL ACTION NAVY
DISTRICT II
CONTRACT N62467-89-D-0318
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ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON, SC 29411-0068
(803) 743-0341

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19 ABSTRACT (Continue on reverse if necessary and identify by block number)

The revised Hazard Ranking System II (HRS II) score was developed for NWIRP McGregor Texas. The HRS II is used to prioritize potential hazardous waste sites for response action and inclusion on the U. S. Environmental Protection Agency's National Priorities List(NPL). The HRS II reanks a site or facility based on actual or potential contamination, contamination migration, and potential exposure via four pathways: groundwater, surface water, soil, and air. At NWIRP McGregor, the HRS II was applied to seven sites and an HRS II score of 16.44 was calculated.

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EXECUTIVE SUMMARY

The HRS score for the Naval Weapons Industrial Reserve Plant, McGregor, Texas is 16.44. Sites scoring above 28.5 are considered potential candidates for the National Priorities List (NPL). The HRS II score was calculated from the following pathway scores:

Groundwater Migration Pathway Score	2.61
Surface Water Migration Pathway Score	3.64
Soil Exposure Pathway Score	6.67
Air Migration Pathway Score	31.90
Overall Site Score	16.44

The Groundwater Migration Pathway was evaluated and scored 2.61 due to the absence of groundwater targets in the surficial aquifer. The Hensel aquifer underlying the surficial aquifer has not been evaluated due to the thickness of the confining layers which protect the aquifer. The Hensel aquifer is 1,000 feet below the surface. The Washita Group serves as a continuous confining unit between the surficial aquifer and the Hensel aquifer and is more than 200 feet thick. The entire 4-mile radius gets its potable water supply from surface water sources outside of the 15-mile downstream distance of the base and from existing water production wells (tapping the Hensel aquifer) located in the City of McGregor, Texas.

The Surface Water Pathway score of 3.64 is low primarily because there are no observed releases to this pathway. In addition, there were no surface water intakes identified within 15 downstream miles of the base. Because fish are caught in this area (from the potential point of entry to Harris Creek), the potential to drive the Human Food Chain Threat portion of this pathway exists. However, since there is no observed release to surface water, this threat is relatively low. Similarly, the Environmental Threat is low because of the absence of an observed release. There are wetlands located near the base and endangered species living in the area that could affect the score of this pathway if there were an observed release.

The Soil Exposure Pathway score of 6.67 is low primarily because of the low population threat score in the area. None of the sites considered are within 200 feet of any area where people live or go to school. In the HRS evaluation, few workers are considered to be exposed to contaminated soil in the drainage ditches.

The Air Migration Pathway score of 31.90 is due to the potential for the release of hazardous substances. There are no documented releases to the air pathway and no sampling data are available. The HRS considers the entire base population and all persons and sensitive environments within the 4-mile radius as potential targets.

The information provided in this HRS II investigation indicates significant data gaps are present. The lack of available sampling analyses performed specifically for HRS scoring purposes limits the scorer's ability to produce a definitive score for the site. Neither the Preliminary Assessment or Site Inspection have been conducted for NWIRP McGregor, Texas because the Initial Assessment Study (IAS) and NACIP Confirmation Studies have been performed and serve the same purpose as the previously mentioned documents according to U.S. Environmental Protection Agency officials.

1.0 INTRODUCTION

The Hazard Ranking System (HRS) Final Report for Naval Weapons Industrial Reserve Plant (NWIRP) McGregor, McGregor, Texas is hereby submitted. The HRS score of 16.44 was calculated using the December 14, 1990, Final Rule Hazard Ranking System in conjunction with the USEPA PREscore software package. The scoring determination is detailed in the attached package. Sites scoring 28.5 or above are considered candidates for the National Priorities List (NPL).

The U.S. Environmental Protection Agency has developed a comprehensive national program to manage past waste disposal sites, primarily in response to increasing national concern regarding past hazardous waste disposal methods. This program is outlined in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of December 1980.

The Department of Defense (DOD) efforts in this area preceded the national CERCLA program. In 1975, the U.S. Army developed a pilot program for DOD to investigate past waste disposal sites at military installations. DOD defined the program as the Installation Restoration Program in 1980, and instructed the services to comply with the program guidelines.

The Navy portion of the program, referred to as the Navy Assessment and Control of Installation Pollutants (NACIP), is managed in three phases. In Phase One, the Initial Assessment Study (IAS), potential threats to human health or to the environment from past hazardous substance storage, handling, or disposal practices at naval activities are identified. This phase is now referred to as the Preliminary Assessment (PA) to conform to CERCLA terminology. In Phase Two, the Confirmation Study, analyses for any contaminants present at sites of concern are performed and the associated migration pathways are determined. For conformity with CERCLA terminology, this phase is now referred to as the Site Inspection (SI) phase . In Phase Three, Remedial Action, any corrective measures needed to mitigate or eliminate confirmed problems are performed. Phase Three would roughly compare to the CERCLA Remedial Phase, which includes the Remedial Investigation/Feasibility Study, the resulting Record of Decision, and the Remedial Design/Remedial Action activities.

The NACIP program focuses attention on past hazardous substance storage, use and disposal practices on Navy property. Current practices are regularly surveyed for conformity with state and federal regulations and are not therefore included in the scope of the NACIP program. The PA addresses operating non-hazardous disposal and storage areas only if these areas also served as hazardous waste disposal or storage areas in the past. Current operations are investigated solely to determine types and quantities of chemicals used and the disposal methods utilized.

The evaluation of NWIRP McGregor has been primarily based upon the previous Initial Assessment Study, NACIP Confirmation Study, Final RCRA Facility Investigation Preliminary Report and Summary of Remedial Action conducted under the direction of the Department of the Navy.

Additional data gathering efforts were conducted by EnSafe/Allen & Hoshall personnel. All pertinent sources of information have been referenced and can be found in the accompanying documentation package.

Program (PRE-score) Disclaimer

Due to inherent flaws in the PRE-score and PRE-print program, the reviewer may encounter a few areas within hard copies of the PRE-score score sheets that appear to be incorrect. Manual calculations were performed to establish the validity of the scores found on the PRE-score score sheets. The HRS Review Score Sheets in Section 3.2 contain the manually calculated score.

EnSafe/Allen & Hoshall has detected probable errors in the PRE-score program. The area affected is the surface water migration pathway (specifically the wetlands and food chain calculations). For NWIRP McGregor, PRE-score incorrectly calculated the wetlands values by failing to add all the wetlands or sensitive environments values. The sums provided by PRE-score were 450 for the sensitive environments value and 625 for the wetlands frontage value. The actual score for the sensitive environments is 575, and the actual sum score for wetlands frontage was 800.

The air pathway calculations are flawed slightly in the PRE-score program. The manual calculated score is 31.90, while the program score is 31.77. At this time the actual error in the program has not yet been identified.

Through the calculations shown in the HRS Review scoresheets, the actual score of NWIRP McGregor, Texas should be 16.44 instead of the reported 16.38 in the PRE-score program.

2.0 SCORING NARRATIVE

2.1 Site Summary

The Naval Weapons Industrial Reserve Plant is a government-owned facility operated by Hercules, Inc. The plant is situated on an irregularly shaped tract of land lying mostly in McLennon County, with a small portion of the western parcel in Coryell County, Texas. The site is located approximately 20 miles southwest of Waco, as shown in Figure 1. The town of McGregor adjoins the facility at the northeast corner and has a population of approximately 4,500 people. The plant is bordered by the St. Louis and Southern Railroad on the north and the Gulf, Colorado and Santa Fe Railroad to the east. The main entrance is located on Johnson Drive off U.S. 84. State Highway 317 runs along the eastern edge of the property and Farm to Market (FM) 2671 runs along a major portion of the southern boundary.

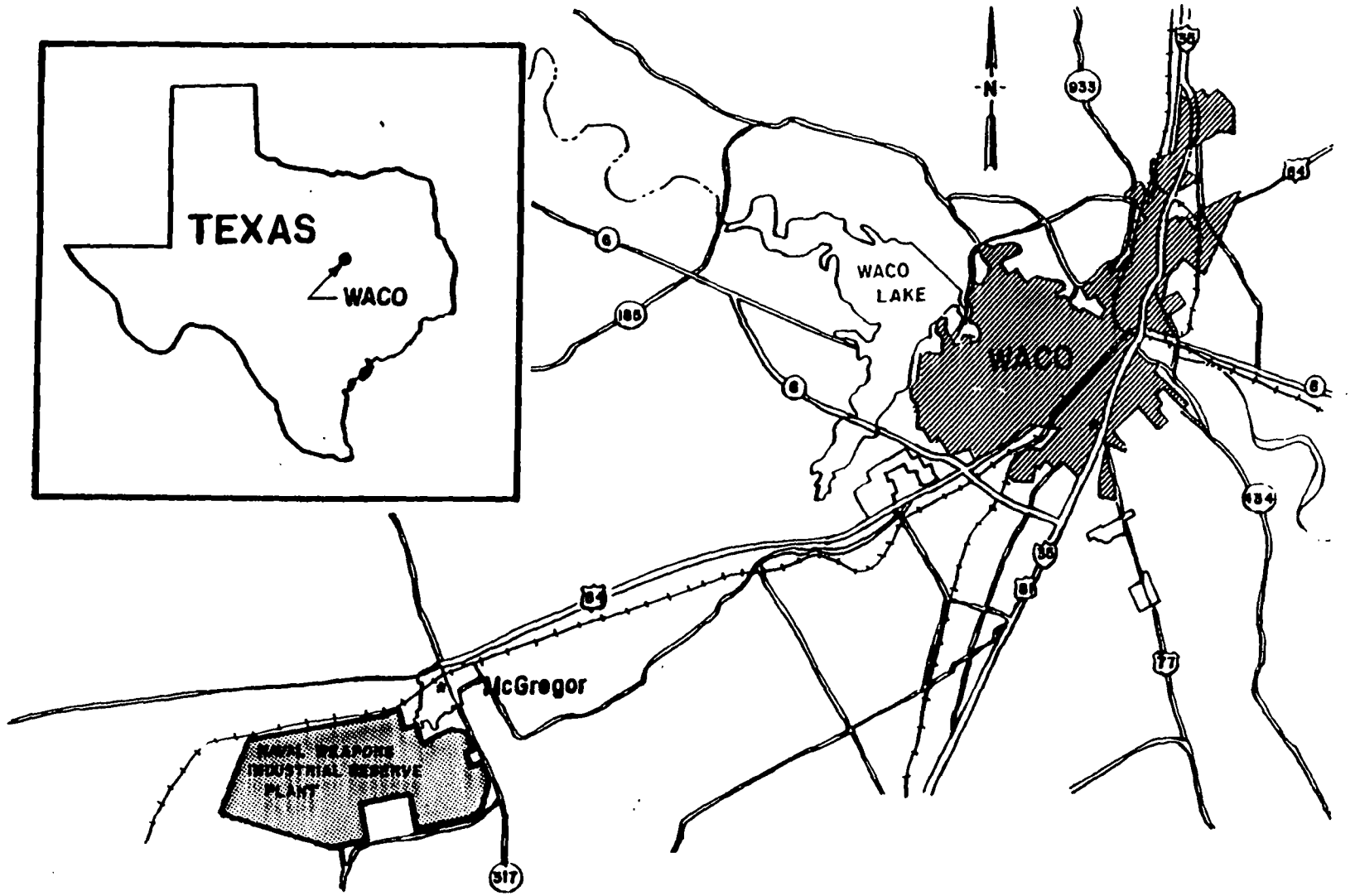
The site presently encompasses approximately 9,700 acres of land. The tract extends approximately 7 miles in the east/west direction and 3 miles in the north/south direction. The layout of the various administrative, storage, manufacturing and burning areas is depicted in Figure 2.

Historical Use of Facility

In 1942, the U.S. Army Ordnance Corps acquired approximately 18,000 acres of land at McGregor, Texas. The Army established the Bluebonnet Ordnance Plant at this site (now NWIRP) and operated the facility as an aircraft bomb loading plant, employing 6,500 workers. On February 11, 1942, authorization was given for the construction of four Group 3 bomb load lines and ammonium nitrate crystallizing units. Later that spring, the proposed capacity of the plant was reduced to three load lines and six crystallizing units. An expansion program started in October 1944 added a fourth load line, now designated as Area M.

This government-owned contractor-operated facility was first run by the National GYPSUM company of Buffalo, New York. Operations began on bomb load lines 1, 2, and 3 October 16, November 27, and December 18, 1942, respectively. The ammonium nitrate plant started production December 7, 1942. The nitrate plant closed in June 1943 and operations of bomb load lines 2 and 3 were suspended in latter part of 1943. Use of the ammonium nitrate crystallizing facility for graining fertilizer grade nitrate began in October 1943. The production of boosters was cancelled in February 1944.

Immediately following World War II, the Bluebonnet Ordnance Plant was transferred from the War Department to the War Assets Administration on April 16, 1946. Shortly after the war, portions of the land were sold to a number of private concerns. In addition, a portion of the



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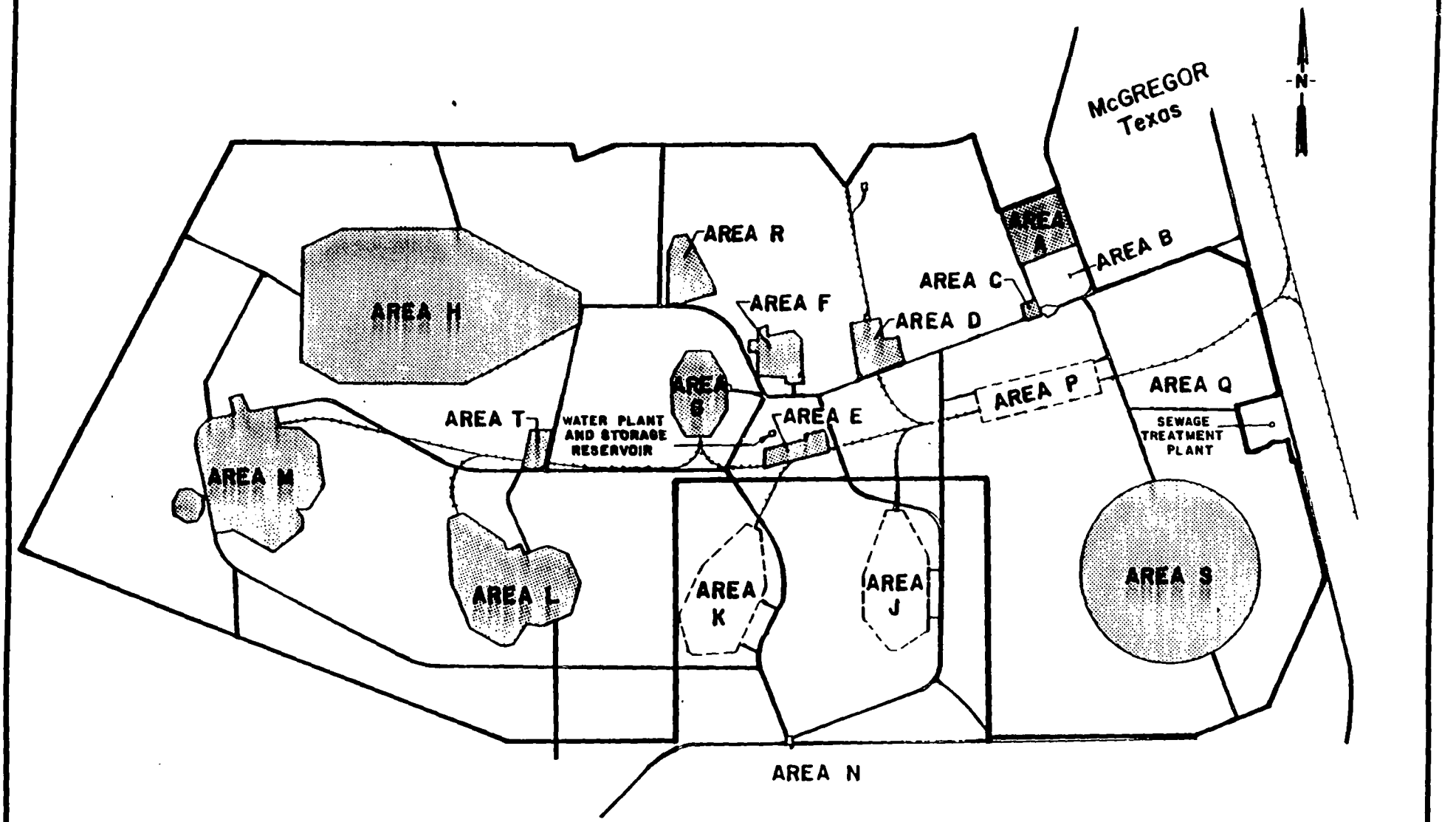
NWIRP - MCGREGOR
MCGREGOR, TEXAS

FIGURE 1
NWIRP - McGREGOR
LOCATION MAP

DATE: 11/19/91 | DWG NAME: 11X8



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1730

NWIRP - MCGREGOR
MCGREGOR, TEXAS

FIGURE 2
NWIRP-McGREGOR
SITE DIAGRAM

DATE: 11/19/91 | DWG NAME: 11X8

plant was conveyed to Texas A&M University for educational and research purposes. All of the parcels sold contained 20-year recapture provisions if re-establishment was required.

In 1952, the Air Force acquired approximately 11,450 acres, the major portion of the site, renaming it Air Force Plant No. 66. The plant was reactivated for the development and production of jet assistance take-off boosters (JATOs) with Phillips Petroleum Company as the operating contractor. Phillips operated the facility for the Air Force until 1958 when North American Aviation joined Phillips in a partnership to form Astrodyne, Inc. The facility subsequently began manufacturing high performance propellants. North American Aviation brought Phillip's share of the partnership in 1959 and the plant became the Solid Rocket Division of Rocketdyne. Under Rocketdyne, the plant was modified to handle a wide variety of solid propulsion systems, exploratory, advanced and engineering development programs, as well as the production programs.

In October 1964, the Air Force asked if the Navy would agree to accept the plant cognizance since the work load was predominately Navy; in November, the Department of the Navy agreed. Following the necessary approvals and congressional concurrences, the transfer was made to the Navy May 1, 1966. The land (approximately 11,450 acres), improvements, machinery and equipment belonging to Air Force Plant No. 66 became known as the Naval Industrial Ordnance Plant under the cognizance of the Naval Ordnance Systems Command. Rocketdyne continued as the operator until January 1978, when Hercules, Inc. assumed the operating responsibilities for the facility. Hercules presently produces a number of solid propellant rocket motors including the Shrike, Sparrow, Phoenix, Sidewinder, and MK 25 JATO for the Navy.

2.2 Source Summary

Eight sources were identified and examined for the purpose of hazard ranking system scoring during this investigation. These sources are:

1.	* RFI Unit # 1	Area - S	Explosives Classification and Disposal Area
2.	* RFI Unit # 2	Area - M	X-Ray Effluent Receiving Ditch
3.	RFI Unit # 3	Area - F	West Settling Ponds
4.	* RFI Unit # 4	Area - R	Acid Contamination Site
5.	* RFI Unit # 5	Area - M	Evaporation Ponds

6.	* RFI Unit # 6	Area - G	Pesticide Dump
7.	* RFI Unit # 7	Area - M	Conversion Coating Treatment Tank
8.	* RFI Unit # 8	Area - F	Diesel Contamination Site

Although all eight sources were included in the scoring, seven sources (those with the asterisks) proved to be the most significant due to the following:

- Availability of analytical data.
- Availability of hazardous waste constituents data.
- Availability of hazardous waste quantity data.
- Availability of data indicating an observed release.

Descriptions of the eight individual sources are provided below; this information was compiled from References 3,and 5 through 16, 42 and 43.

RFI Unit No. 1, Area S — Explosives Classification and Disposal. Area S has been used since 1942 as the official burning ground for material generated by the plant that does not meet specifications. Materials reportedly burned in this area include:

- Toluene
- 1,1,1, Trichloroethane
- Chlorinated benzene
- Ammonium perchlorate (AP) based explosives, approximately 80 percent AP
- Ammonium nitrate based explosives
- Solvents contaminated with explosives during manufacturing and clean-up operations
- Contaminated paper and rags used during clean up operations.

The area is located in the southeast corner of the site. It is described as a 4,800-foot diameter circle (approximately 415 acres) with a four-strand barbed wire fence around the perimeter. The burn operations take place in the center of a clay lined, bermed area that will reportedly contain a 100-year rainfall event without surface runoff. The berms are designed to prevent horizontal migration of burn residue. Conversely, the clay liner is designed to prevent vertical migration of contaminants downward into the underlying soils and groundwater.

Surface runoff within the bermed area migrates to the southeast corner where it pools and evaporates. Discounting a breach of the berm or a rainfall event exceeding the maximum capacity of the bermed area, the risk of contamination migrating laterally from Area S appears to be remote.

RFI Unit No. 2, Area M — X-Ray Effluent Receiving Ditch. In 1963 Rocketdyne constructed building M-1288 to house X-ray equipment used for the nondestructive testing of rocket motors. Original equipment included a 13-MEV LINAC and a GE 1000-KV X-ray machine. Hercules currently operates a 2-MEV LINAC and a Varin 200 X-ray machine. Because these machines derive their energy from an electromagnetic source, no radioactive materials are present at this site.

A silver recovery unit operated in the building reclaims silver from the process fluids used in film developing. Until 1988, the effluent from the reclamation unit was discharged into an open ditch that runs alongside building M-1288. The ditch drains southward into Station Creek, which eventually flows into in the Brazos River. Discharges to the ditch were allowed under an NPDES permit.

In January 1988, Hercules, Inc. took the old silver recovery unit out of service and replaced it with a new recirculating system. The new system diverts part of the developing process effluent into 55-gallon drums which are shipped offsite for reclamation or disposal. The remaining effluent is held in a 30-gallon surge tank before being pumped through several 20-gallon steelwool filled canisters. The steelwool canisters are designed to remove the excess silver through an ion exchange process. When the steelwool canisters' exchange capacity has been reached, the canisters are shipped offsite for reclamation or disposal. The effluent from the canisters is sent to the Area M wastewater treatment plant which consists of an Imhoff settling tank and several oxidation basins.

RFI Unit No. 3, Area F — West Settling Ponds. Three ponds, designated as the west settling ponds, are located immediately west of Area F just outside the boundary fence. Wastewater generated in buildings F-611, 614, 617, and 620 was discharged to the ponds through a network of covered concrete flumes. Waste materials typically discharged to the ponds include triamino-trinitro-benzene (TATB), trichloro-trinitro-benzene (TCTNB), trichlorobenzene (TCB), toluene, ammonium nitrate, and ammonium perchlorate. An assessment to determine the past hazardous materials management for Area F was conducted in 1981. The assessment concluded there was the potential for surface water and shallow groundwater contamination from waste discharged into the three wastewater ponds.

Analyses of the first year's data indicated a significant possibility of groundwater contamination downgradient of the west ponds. Hercules, Inc. decided in late 1982 to submit a closure plan for the west ponds because RCRA regulations scheduled to take effect January 23, 1983 would require continued compliance monitoring of the ponds and possible corrective actions. Closure efforts began in December 1982.

Closure activities included excavating the bottom waste sediments from the ponds, petitioning EPA to delist the waste by showing that TATB contaminated sediments below 15 percent TATB are not reactive as described in 40 CFR Part 261.23 (a) (6) and (7), disposing of the waste in a newly created Class II landfill within Area S, backfilling the excavated areas with adjacent onsite soils, and plugging the groundwater monitoring wells. Certification of clean closure was submitted to TDWR on January 25, 1984, and no record of further corrective measures in the west settling ponds area is available.

RFI Unit No. 4, Area R — Acid Contamination Site. The buildings in this area were constructed by the Air Force in the early 1950's for use by Phillips Petroleum. The area was designed primarily for testing rocket motors. These tests include static firing and various environmental tests. The environmental testing was performed to simulate extreme weather conditions encountered by the rocket motors while in actual use.

Acid etching of steel motor casings was occasionally performed in the area during the 1970's. This activity was conducted every other year and reportedly generated 15 to 20 gallons of acid bearing waste which was dumped on the ground behind Building R-1601.

RFI Unit No. 5, Area M — Evaporation Ponds. After World War II, Area M was used exclusively to manufacture various types of rocket motors. The two basic oxidizers manufactured for composite propellants were ammonium nitrate and ammonium perchlorate. Processing capacity was 12 million pounds per year of each type. Ammonium perchlorate

processing was conducted in several buildings. Initially, the oxidizer was ground, graded, and weighed in building F-611. Propellant was mixed in building M-1229 and/or M-1230; each building contained a 300-gallon Baker Perkins mixer. These mixers were remotely controlled from building M-1231. The small and medium sized rocket motors were cast in building M-1217 and cured in buildings M-1219 and M-1224. Propellants were trimmed in building M-1237, and motors were assembled in building M-1224. The second propellant, ammonium nitrate was processed in another group of buildings using a process similar to the ammonium perchlorate process. Oxidizer was dried, ground, and weighed in building F-611.

The propellant was mixed, blocked and extruded in building M-1227, which contained a mixing and forming line designed specifically for this phase of manufacture. Five 100-gallon Baker Perkins mixers were located in the building. A large, hot-air oven in building M-1219 was used for nitrate propellant cure, while motors were assembled in either building M-1227 or M-1224. Dry clean-up techniques were employed in the process areas. The scrap material was disposed of at the burning ground in Area S.

Limited quantities of wastewater were generated from propellant processing activities located in buildings M-1217 and M-1227. The wastewater was discharged into small evaporation ponds located between the buildings. Normally, these ponds did not have a discharge, but occasional overflows from the ponds were piped to a drainage ditch which flows to the south and eventually flows into a tributary of Station Creek.

There are no data available to conclude that hazardous wastes have been released to these ponds. There is no record of the present operator of the plant (Hercules, Inc.) having discharged effluent to the ponds and no historical record of past discharges.

RFI Unit No. 6, Area G — Pesticide Dump. The pesticide dump is located in Area G and is described as an area 60 feet wide by 600 feet long between the perimeter road and the boundary fence. The site reportedly dates back to the 1948-1952 period when Area G was operated by Ciba-Geigy Company as a pesticide formulation plant. The chemicals used in Area G during the Geigy period of operation included DDT, toxaphene, parathion, sulfur, aldrin-dieldrin, chlordane-heptachlor, BHC-Lindane, and endrin. This list of chemicals was obtained from the *Soils Contamination Investigation* undertaken in 1979 by Southern Division Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), and from conversations with a representative of Geigy Company's (now Ciba-Geigy) environmental control office in Ardsley, New York. The Envirodyne *Initial Assessment Study* was primarily an analysis of the data collected in 1979, and considered local factors such as geology, hydrogeology, land use, and surface water.

The pesticide dump is located within the Harris Creek watershed. Surface drainage flows in a general northeastern direction from the pesticide dump site. The actual surface drainage at the site is poorly defined. The perimeter road is slightly raised, but runoff from the site probably crosses the road. There is no indication of erosion, because the slope is generally too slight for noticeable erosion to occur. The pesticide contamination at Area G was first documented by the Navy in 1979. The *Soil Contamination Investigation* report discussed the history and past operations of the site, the affected areas and the surrounding areas which could have been affected by the pesticides. The results indicated the pesticides were located principally in the areas where vegetation was sparse. The primary pesticide found was DDT. At this time, it was felt that significant concentrations were only 6 to 8 inches deep. However, two deeper soil samples indicated that pesticide concentrations were slightly higher at 42 inches deep than at 24 inches.

The Navy's *Confirmation Study and Summary of Remedial Action* reported on an analysis of a series of areal photographs of the site from 1952 to 1982. Soil sampling in the areas devoid of vegetation was conducted in 1982 and 1983. This study confirmed that the bare areas were the locations of high pesticide concentrations. That report stated the higher concentrations were limited to the upper 12 inches of soil. Remedial activities slowed until February 1988, when a Hercules subcontractor discovered a layer of white to off-white substance in the shallow sub-surface while trenching for a footer beside building G-704. This soft white crystalline substance began to smolder when it was exposed to heat during the cutting of an underground steel pipe. Hercules' lab identified the substance as DDT. The sample was also tested by an independent lab and the analysis confirmed the presence of DDT and its daughter compounds DDD and DDE. These analytical results show the level of DDT in the substance was 582,000 mg/kg. SOUTHNAVFACENGCOM recommended that Ciba-Geigy be held responsible for a remedial investigation of this area to determine the extent of pesticide affected soil.

A Draft Narrative Report, written by ERM-Southwest Inc. (Fall 1992), presenting results and implementation of the RCRA Facility Investigation Workplan (RFI), for RFI Unit # 6 (Area G) at the Naval Weapons Industrial Reserve Plant, McGregor, Texas has been recently obtained. The purpose of the RFI in Area G was to characterize prior releases as required by the Hazardous and Solid Waste Amendments for facilities seeking a final RCRA permit. Soil samples were collected during two sampling events, June 22-29, 1992 and July 7-13, 1992 by ERM-Southwest, Inc. in accordance with the RFI Workplan prepared by EnSafe/Allen & Hoshall.

This Draft Narrative Report confirms the findings stated in the Navy's Confirmation Study and Summary of Remedial Action reports, that elevated levels of organochloride pesticides are present at the Burn Pit Area and various locations around Buildings 704 and 705. Random

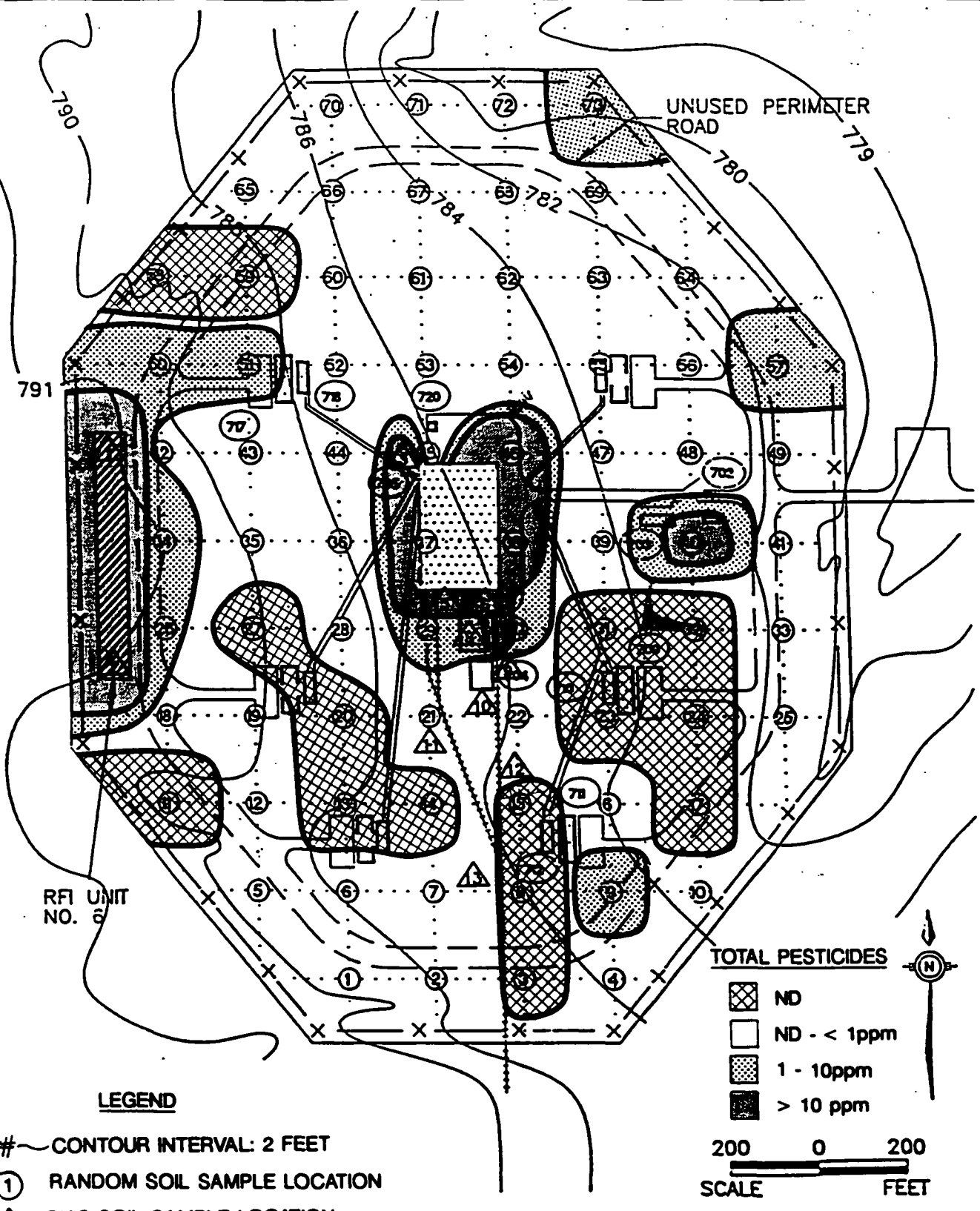
sampling results identified four additional isolated locations exhibiting slightly elevated organochloride pesticide concentrations.

Areas of affected soil appear to be well delineated by this and previous sampling events are shown in Figures 3, and 4.

RFI Unit No. 7, Area M — Conversion Coating Treatment Tank. Building M-1206 is the hardware preparation area, where treatment and coating of metal parts occurs. The phosphate treatment of motor cases was conducted in this building from 1954 to 1958. Spent plating and treatment solutions were discharged to a treatment tank located behind Building M-1206. Wastewater from process rinse tanks in Building M-1206 was discharged directly to a drainage ditch which runs behind the treatment tank in a northerly direction emptying into a stock pond. Various spent baths were sent to the treatment tank where sodium bisulfite was utilized to reduce excess hexavalent chromium to its trivalent state. The solution was then neutralized with calcium hydroxide, which produces an insoluble calcium sulfate precipitate, that was disposed of by an outside contractor. The neutralized supernatant was then discharged to the drainage ditch behind the treatment tank. Occasionally, unspecified quantities of wastewater produced by a steel passivation process utilizing nitric acid and sodium dichromate were discharged without treatment to the drainage ditch.

RFI Unit No. 8, Area F — Diesel Contamination Site. A number of processing chemicals are stored in and around Area F buildings. These include: fuel oil, toluene, ammonium perchlorate, sulfuric acid, sodium hydroxide, and acetone. Building F-603 houses two 44.75 MBTU boilers which provide high pressure steam to processes in Area F. The boilers are gas fired but have the capability to run on No. 2 fuel oil (diesel) if there is a curtailment of natural gas. Fuel oil is stocked in an above-ground 25,000-gallon tank located east of Building F-603. While digging a trench beside Building F-603, Hercules representatives reported the discovery of a concrete tank saddle and a significant amount of diesel contamination in the sub-surface soils in front of the southwest corner of the existing sulfuric acid tank.

The descriptions above were obtained from the previous Initial Assessment Study, NACIP Confirmation Study, Final RCRA Facility Investigation Preliminary Report, Draft narrative Report RCRA Facility Investigation and Summary of Remedial Action for NWIRP McGregor, Texas. As a result of the data collection and reduction process, all sources were not selected for HRS scoring. It should be noted that none of the previous studies have been conducted in a manner to specifically provide data for the HRS process.



NOTE: NO SAMPLES WERE TAKEN BELOW THE FLOOR, BUILDING 705.

ERM-Southwest, Inc.
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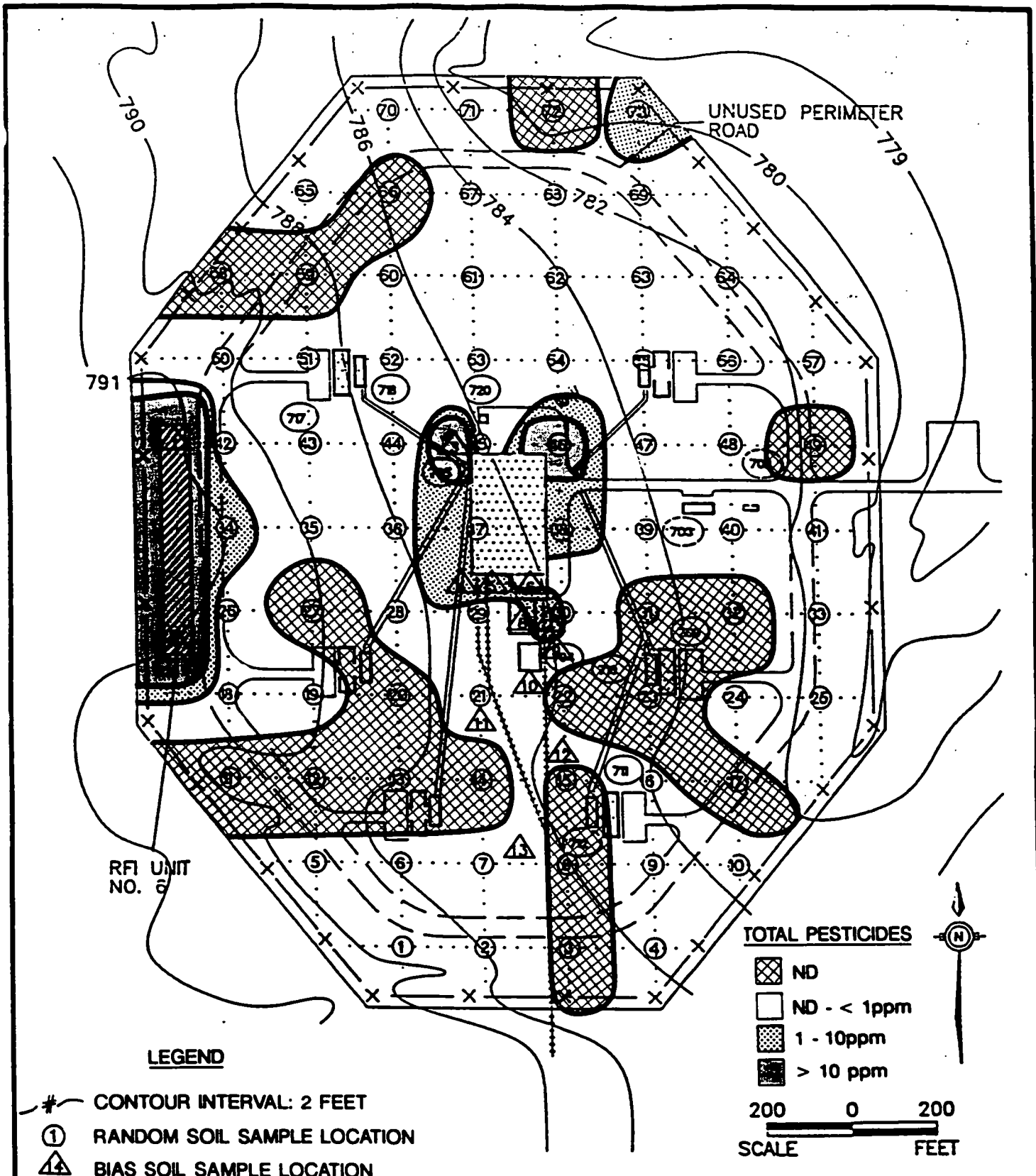
DATE 10/26/92 | W.O.NO. 5301A028

FIGURE 3
AREAL DISTRIBUTION OF ORGANOCHLORINE PESTICIDES
0-1 FOOT INTERVAL
NWIRP
McGregor, Texas



NOTE: NO SAMPLES WERE TAKEN BELOW THE FLOOR, BUILDING 705.

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FIGURE 4

AREAL DISTRIBUTION OF ORGANOCHLORINE PESTICIDES
1 - 2 FOOT INTERVAL
NWIRP
McGregor, Texas

2.3 Significant Assumptions

This section focuses on the significant assumptions made during the scoring process. These and other assumptions are detailed in the PRE-score scoresheets and/or the PRE-score floppy diskette. The section has been subdivided to address the pertinent sites independently.

2.3.1 Surface Water Pathway — (Selection)

Three surface water pathways could be considered as primary surface water pathways. These are: (1) the Harris Creek surface water pathway, (2) the Station Creek surface water pathway, and (3) the South Bosque River surface water pathway. There are two specific areas which use surface water as a potable water source. The City of Waco uses the Lake Waco reservoir as its exclusive source of drinking water. The City of McGregor uses the Lake Belton reservoir as a surface water source of drinking water along with groundwater (McGregor has four groundwater production wells in use). Because the surface water intakes from each of the reserviors are beyond the 15-mile downstream limit, there are no targets associated with any pathway — it is assumed that any one of the surface water pathways will yield the same number of targets. Therefore, the Harris Creek pathway (pathway # 1) is the surface water pathway scored.

2.3.2 RFI Unit # 2 - Area M, X-Ray Effluent Receiving Ditch
RFI Unit # 4 - Area R, Acid Contamination Site
RFI Unit # 7 - Area M, Conversion Coating Treatment Tank

Observed Release vs Potential Release — Sampling data are not available for sediment within any of the aforementioned drainage ditches. Therefore, to document an observed release to surface water, it would be necessary to classify the drainage ditches as part of the in-water segment of the surface water pathway. The drainage ditches do lead to surface water bodies, in most cases, more than half a mile from the initial source. However, it is assumed the sites are a source from which the potential to release exists for the surface water pathway. Arguments could be made for or against this perspective. It has been assumed the drainage ditches are not part of the in-water segment. Based on this assumption, the drainage ditches were also scored under the soil pathway.

Targets — It has been assumed that the stream and rivers composing the in-water segment serve as fisheries. It has also been assumed that each leg of the in-water segment produces 100

pounds of fish per year. After significant debate regarding the lack of available documentation, it was determined it would be unreasonable to assume these surface water bodies did not harbor fish or no one fishes in them.

2.3.3 RFI Unit # 8 - Area F, Diesel Contamination Site

Hazardous Waste Quantity — The extent and level of contamination in the fill material beneath the diesel contamination site is currently unknown. The RFI currently in progress will provide data to assess the contamination. During the site visit, the volume of soil contamination was estimated to be 208 cubic yards. More information will be gathered during the RFI investigation concerning the estimated quantities of hazardous substances that may have been released during normal operations. The information from the RFI will be available in early 1993.

2.4 Pathway Score Summary

The HRS score of 16.44 was calculated from the pathway scores outlined below:

Pathway Scores:

Groundwater Migration Pathway Score	2.61
Surface Water Migration Pathway Score	3.64
Soil Exposure Pathway Score	6.67
Air Migration Pathway Score	31.90

The driving threat or target associated with each of the above pathway scores is described in the following paragraphs. For the groundwater migration pathway, high hazardous waste quantity values were determined; however, there were no targets to consider in the surficial aquifer because of the Hensel aquifer's depth and the thickness of the protective confining layer between the surficial aquifer and the Hensel aquifer. High hazardous waste quantity values and high waste factors (toxicity, mobility, etc.) are attributed to the surface water overland flow migration pathway; however, because all targets to the surface water pathway are outside the 15-mile downstream limit the relaitive risk remains low, producing a low score. For the residential soil exposure pathway, high hazardous waste quantity values and moderate waste factors were determined; however, no targets were identified for this particular pathway. Due to the lack of an observed release to the air pathway, this pathway was classified primarily as low risk.

The Groundwater Migration Pathway was evaluated and was scored because wells were identified in the surficial aquifer within the 4-mile radius of the facility. The surficial aquifer is used as a resource to irrigate and water livestock.
(Reference 5,12,13,14,15,16,21,22,23,24,25,26,27).

The Surface Water Migration Pathway was driven solely by the overland flood migration. The low score is due to the lack of data to identify any observed releases to the surface water migration pathway (Reference 14,15,16,19,20,27,29,30,32).

The Soil Exposure Pathway was evaluated and achieved a score of 6.67. According to the HRS Final Rules the evaluation of the soil pathway is based on two threats: Resident Population threat and Nearby Population threat. For NWIRP McGregor, the base external and internal security measures prevent public access to the source areas with 8 and 6-foot high chain link fences topped with barbed wire mounted on outriggers. Access to NWIRP McGregor, Texas is limited through the use of guarded gates. Onsite personnel and workers do have some limited exposure. (Reference 8,16,36).

The Air Migration Pathway score was driven primarily by the high number of potential targets. Due to the high hazardous waste characteristics values and the lack of an observed release to the air pathway, the pathway has a score of 31.90.

3.0 SCORING SHEETS

3.1 HRS Score Sheets

TABLE 3-1
GROUNDWATER MIGRATION PATHWAY SCORE SHEET

Factor Categories and Factors

	Likelihood of Release to an Aquifer	Maximum Value	Value Assigned	
1.	Observed Release	550	0	
2.	Potential to Release			
	2a. Containment	10	10	
	2b. Net Precipitation	10	3	
	2c. Depth to Aquifer	5	5	
	2d. Travel Time	35	35	
	2e. Potential to Release [lines 2a x (2b + 2c +2d]	500	430	
3.	Likelihood of Release (higher of lines 1 and 2e)	550		430
	Waste Characteristics			
4.	Toxicity/Mobility	a	1×10^4	
5.	Hazardous Waste Quantity	a	10,000	
6.	Waste Characteristics	100		100
	Targets			
7.	Nearest Well	50	-0-	
8.	Population			
	8a. Level I Concentrations	b	-0-	
	8b. Level II Concentrations	b	-0-	
	8c. Potential Contamination	b	-0-	
	8d. Population (lines 8a + 8b + 8c)	b	-0-	
9.	Resources	5	5	
10.	Wellhead Protection Area	20	-0-	
11.	Targets (lines 7 + 8d + 9 +10)	b		5
	Ground Water Migration Score for an Aquifer			
12.	Aquifer Score [(lines 3 x 6 x 11)/82,500][c]	100		2.61
	Ground Water Migration Pathway Score			
13.	Pathway Score (S_{gw}), (highest value from line 12 for all aquifers evaluated)[c]	100		2.61

TABLE 4-1
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE SHEET

Factor Categories and Factors		Maximum Value	Value Assigned	
DRINKING WATER THREAT				
	Likelihood of Release			
1.	Observed Release	550	0	
2.	Potential to Release by Overland Flow			
	2a. Containment	10	10	
	2b. Runoff	25	25	
	2c. Distance to Surface Water	25	6	
	2d. Potential to Release by Overland Flow (lines 2a x [2b + 2c])	500	310	
3.	Potential to Release by Flood			
	3a. Containment (Flood)	10	10	
	3b. Flood Frequency	50	50	
	3c. Potential to Release by Flood (lines 3a x 3b)	500	500	
4.	Potential to Release (lines 2d + 3c, subject to a maximum of 500)	500	500	
5.	Likelihood of Release (higher of lines 1 and 4)	550		500
	Waste Characteristics			
6.	Toxicity/Persistence	a	$1x10^4$	
7.	Hazardous Waste Quantity	a	1000	
8.	Waste Characteristics	100		100
	Targets			
9.	Nearest Intake	50	-0-	
10.	Population			
	10a. Level I Concentrations	b	-0-	
	10b. Level II Concentrations	b	-0-	
	10c. Potential Contamination	b	-0-	
	10d. Population (lines 10a + 10b + 10c)	b	-0-	
11.	Resources	5	5	

TABLE 4-1 (Continued)

Factor Categories and Factors		Maximum Value		Value Assigned
DRINKING WATER THREAT (Concluded)				
	Targets (Concluded)			
12.	Targets (lines 9 + 10d +11)	b		5
	Drinking Water Threat Score			
13.	Drinking Water Threat Score ([lines 5 x 8 x 12]/82,500, subject to a maximum of 100)	100		3.03
HUMAN FOOD CHAIN THREAT				
	Likelihood of Release			
14.	Likelihood of Release (same value as line 5)	550		500
	Waste Characteristics			
15.	Toxicity/Persistence/Bioaccumulation	a	5×10^8	
16.	Hazardous Waste Quantity	a	1000	
17.	Waste Characteristics	1,000		1000
	Targets			
18.	Food Chain Individual	50	-0-	
19.	Population			
	19a. Level I Concentrations	b	-0-	
	19b. Level II Concentrations	b	-0-	
	19c. Potential Human Food Chain Contamination	b	3.6×10^{-5}	
	19d. Population (lines 19a + 19b + 19c)	b	3.6×10^{-5}	
20.	Targets (lines 18 +19d)	b		3.6×10^{-5}
	Human Food Chain Threat Score			
21.	Human Food Chain Threat Score ([lines 14 x 17 x 20]/82,500, subject to a maximum of 100)	100		2.1×10^4

TABLE 4-1 (Continued)

Factor Categories and Factors		Maximum Value		Value Assigned
ENVIRONMENTAL THREAT				
	Likelihood of Release			
22.	Likelihood of Release (same value as line 5)	550		500
	Waste Characteristics			
23.	Ecosystem Toxicity/Persistence/ Bioaccumulation	a	5×10^{8}	
24.	Hazardous Waste Quantity	a	1000	
25.	Waste Characteristics	1,000		1000
	Targets			
26.	Sensitive Environments			
	26a. Level I Concentrations	b	-0-	
	26b. Level II Concentrations	b	-0-	
	26c. Potential Contamination	b	1.008×10^{-1}	
	26d. Sensitive Environments (lines 26a +26b +26c)	b	1.008×10^{-1}	
27.	Targets (value from line 26d)	b		1.008×10^{-1}
	Environmental Threat Score			
28.	Environmental Threat Score ([lines 22 x 25 x 27]/82,500, subject to a maximum of 60)	60		0.61
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE FOR A WATERSHED				
29.	Watershed Score[c] (lines 13 + 21 + 28, subject to a maximum of 100)	100		3.64
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE				
30.	Component Score (S_{of})[c] (highest score from line 29 for all watersheds evaluated, subject to a maximum of 100)			3.64

TABLE 5-1
SOIL EXPOSURE PATHWAY
SCORE SHEET

Factor Categories and Factors		Maximum Value		Value Assigned
RESIDENT POPULATION THREAT				
	Likelihood of Exposure			
1.	Likelihood of Exposure	550		550
	Waste Characteristics			
2.	Toxicity	a	10,000	
3.	Hazardous Waste Quantity	a	10,000	
4.	Waste Characteristics	100		100
	Targets			
5.	Resident Individual	50	-0-	
6.	Resident Population			
	6a. Level I Concentrations	b	-0-	
	6b. Level II Concentrations	b	-0-	
	6c. Resident Populations (lines 6a + 6b)	b	-0-	
7.	Workers	15	5	
8.	Resources	5	5	
9.	Terrestrial Sensitive Environments	c	-0-	
10.	Targets (lines 5 +6c + 7 + 8 + 9)	b		10
	Resident Population Threat Score			
11.	Resident Population Threat (lines 1 x 4 x 10)	b		550,000
NEARBY POPULATION THREAT				
	Likelihood of Exposure			
12.	Attractiveness/Accessibility	100	5	
13.	Area of Contamination	100	100	
14.	Likelihood of Exposure	500		50
	Waste Characteristics			
15.	Toxicity	a	10,000	
16.	Hazardous Waste Quantity	a	10,000	
17.	Waste Characteristics	100		100

TABLE 5-1 (Continued)

Factor Categories and Factors		Maximum Value		Value Assigned
NEARBY POPULATION THREAT (Concluded)				
	Targets			
18.	Nearby Individual	1	-0-	
19.	Population Within 1 Mile	b	-0-	
20.	Targets (lines 18 + 19)	b		-0-
	Nearby Population Threat Score			
21.	Nearby Population Threat (lines 14 x 17 x 20)	b		-0-
SOIL EXPOSURE PATHWAY SCORE				
22.	Soil Exposure Pathway Score[d] (s_s), (lines [11+21] ÷ 82,500, subject to a maximum of 100)	100		6.67

TABLE 6-1
AIR MIGRATION PATHWAY
SCORE SHEET

Factor Categories and Factors

		Maximum Value	Value Assigned	
Likelihood of Release				
1.	Observed Release	550	-0-	
2.	Potential to Release			
	2a. Gas Potential to Release	500	360	
	2b. Particulate Potential to Release	500	330	
	2c. Potential to Release (higher of lines 2a and 2b)	500	360	
3.	Likelihood of Release (higher of lines 1 and 2c)	550		360
	Waste Characteristics			
4.	Toxicity/Mobility	a	1000	
5.	Hazardous Waste Quantity	a	1×10^4	
6.	Waste Characteristics	100		56
	Targets			
7.	Nearest Individual	50	20	
8.	Population			
	8a. Level I Concentrations	b	-0-	
	8b. Level II Concentrations	b	-0-	
	8c. Potential Contamination	b	105.26	
	8d. Population (lines 8a + 8b + 8c)	b	105.26	
9.	Resources	5	5	
10.	Sensitive Environments			
	10a. Actual Contamination	c	-0-	
	10b. Potential Contamination	c	0.2675	
	10c. Sensitive Environments	c	0.2675	
11.	Targets (lines 7 +8d + 9 + 10c)	b		130.53
	Air Migration Pathway Score			
12.	Pathway Score (S_a) [(lines 3 x 6 x 11)/82,500][d]	100		31.90

3.2 HRS Review Score Sheets

HRS REVIEW SCORE SHEETS

FINAL SCORE CALCULATIONS

	$S_{pathway}$	$S^2_{pathway}$
Groundwater Migration Pathway Score (S_{gw})	2.61	6.81
Surface Water Migration Pathway Score (S_{sw})	3.64	13.25
Soil Exposure Pathway Score (S_s)	6.67	44.49
Air Migration Pathway Score (S_a)	31.90	1017.61
$S^2_{gw} + S^2_{sw} + S^2_s + S^2_a$		1082.16
$(S^2_{gw} + S^2_{sw} + S^2_s + S^2_a)/4$		270.54
$[(S^2_{gw} + S^2_{sw} + S^2_s + S^2_a)4]^{½} = S$		16.44

SITE NAME: Naval Weapons Industrial Reserve Plant, McGregor, Texas

PREPARER: Sandra J. Farmer

HRS REVIEW SCORE SHEETS
WASTE CHARACTERIZATION WORKSHEET

SOURCES

1. RFI Unit # 2 - Area M, X-Ray Effluent Receiving Ditch

2. RFI Unit # 4 - Area R, Acid Contamination Site

3. RFI Unit # 5 - Area M, Evaporation Ponds

4. RFI Unit # 6 - Area G, Pesticide Dump

5. RFI Unit # 7 - Area M, Conversion Coating Treatment Tank

6. RFI Unit # 8 - Area F, Diesel Contamination Site

7. RFI Unit #1 - Areas, Explosive Classification and Disposal

Reference/Comment: IAS and RFI for NWIRP McGregor Texas.

TIERS A & B	SOURCE HAZARDOUS WASTE QUANTITY FACTOR WORKSHEET	SECTION 1

1. WASTESTREAM QUANTITY SUMMARY TABLE

Complete the following table using all available data to allocate hazardous constituents and hazardous wastestreams to sources. Consider those hazardous constituents and hazardous wastestreams that cannot be allocated to any specific source as constituting a separate "unallocated source". However, do not include in the unallocated source for a pathway any hazardous constituent or hazardous wastestream for which definitive information indicates the constituent or wastestream could only have been placed in sources with a containment value of 0 for that pathway. If hazardous constituent or hazardous wastestream data for a source is adequately determined (see HRS Sections 2.4.2.1.1 and 2.4.2.1.2) on the source is the unallocated source, assign the volume and area measures a value of 0. If either of these conditions is met for a source, proceed to Section 3 of this worksheet. If neither condition is met, proceed to Section 2.

Source Number	Pathway	1. (a) Wastestream Name	(b) Wastestream Hazardous Constituent Quantity (S) (lbs)	(c) S Assigned Value [S = 1(b)]	(d) Are Data Adequately Determined?	(e) Hazardous Wastestream Quantity (W) (lbs)	(f) W Assigned Value* [1(e) ÷ 5,000]	(g) Are Data Adequately Determined?
1	GW [x] SW [x] AIR [x] SOIL [x]	X-Ray effluent receiving ditch (Silver)	0	0				YES
					NO	93,750,000	18,750	
2	GW [x] SW [x] AIR [ ] SOIL [x]	Acid contamination site	0	0				YES
					NO	1300	0.26	
	GW [ ] SW [ ] AIR [ ] SOIL [ ]				YES			YES
					NO			NO
	GW [ ] SW [ ] AIR [ ] SOIL [ ]				YES			YES
					NO			NO
Unallocated Source	GW [ ] SW [ ] AIR [ ]				YES			YES
					NO			NO

* Do not round to the nearest integer

Reference/Comment: *See comments # 1 thru # 2.*

HRS REVIEW SCORE SHEET

1. A silver recovery unit is operated in building M-1288 to reclaim silver from the process fluids used in film developing. From 1963 until 1988, the effluent from the reclamation unit was discharged into an open ditch that runs alongside Building M-1288. approximately 1,500 gallons of effluent per day were discharged into the ditch, 5 days per week. The total amount of effluent discharged curing the 25 years of operation is: 1,500 gal/day x 5 days/week x 25 yr = 9,375,000 gal. 9,375,000 gal x 10lb/gal = 9.375×10^7. The available records indicate a silver recovery unit was not used until 1979. The ditch drains southward into Station Creek, which eventually flows in the Brazos River. Discharges to the ditch were permitted under an NPDES permit. (Ref. 7, 14, 15, 16)

2. According to the preliminary RFI, acid etching was conducted every other year and generated acid bearing waste, which was dumped on the ground behind Building R-1601. During the HRS site visit, a worker at Building R-1601 stated, that on the average, 8 to 18 gallons were dumped each year. In our judgement, the worker's estimate of the gallons of waste dumped is more accurate than the preliminary RFI. Therefore, the total pounds of acid waste dumped during the 10-year period of operation is: 13/gal/yr x 10 yr x 10lb/gal = 1,300 lb. (Ref. 5, 14, 15, 16, 36)

TIERS C & D	SOURCE HAZARDOUS WASTE QUANTITY FACTOR WORKSHEET	SECTION 2

2. SOURCE VOLUME/AREA FACTOR TABLE

If source volume can be determined, do not evaluate the area measure. Instead, assign area a value of 0 and proceed to Section 3 of this worksheet.

Source	Pathway	1. (a) Source Type*	(b) Source Volume (V)	(c) Volume Divisor (Table 2-5)* (Table 5-2)*	(d) V Assigned Value** [2(b) ÷ 2(c)]	(e) Source Area (A)	(f) Area Divisor (Table 2-5)* (Table 5-2)*	(g) A Assigned Value** [2(e) ÷ 2(f)]
3	GW [x] SW [x] AIR [x]	Surface Impound	0	0	0	6,000	13	461.54
	SOIL [x]				0	6,000	13	461.54
4	GW [x] SW [x] AIR [x]	Contaminated Soil	0	0	0	958,000	34,000	28.18
	SOIL [x]					958,000	34,000	28.18
5	GW [x] SW [ ] AIR [ ]	Surface Impound	0	0	0	3,000	13	230.77
	SOIL [x]					3,000	13	230.77
6	GW [x] SW [ ] AIR [x]	Contaminated soil	208.33	2,500	8.33×10^{-2}	N/A	N/A	N/A
	SOIL [x]		208.33	2.5	83.33	N/A	N/A	N/A
7	GW [ ] SW [ ] AIR [X]	Contaminated soil Burn Pit	0	0	0	18,077,400	34,000	531.69
	SOIL [X]					18,077,400	34,000	531.69

* Use Table 2-5 for the groundwater, surface water, and air pathways. Use Table 5-2 for the soil exposure pathway.

** Do not round to the nearest integer

Reference/Comment: See comments # 3 thru # 7.

3. Limited quantities of wastewater were generated from propellant processing activities located in Buildings M-1217 and M-1227. The wastewater was discharged into small evaporation ponds located between the buildings. Normally, these ponds did not discharge, but overflow from the ponds was piped to a drainage ditch which flows to the south and eventually empties into a tributary of Station Creek. An EnSafe/Allen & Hoshall employee and a representative for Hercules took visual site measurements and estimated the size of the two ponds to be 6000 square feet. (Ref. 5, 8, 14, 15, 16)

4. The pesticide contamination at Area G was first documented by the Navy in 1979. The pesticide dump is located in Area G and is described as an area 60 feet wide by 600 feet long between the perimeter road and the boundary fence. However, ERM-Southwest, Inc. states in its Draft RFI Report that at the soil sampling interval of 0-1 foot, there are large areas containing pesticide contamination. Adding these areas to the existing 60 x 600 foot dump area results in approximately 958,000 square feet of pesticide contaminated soil. (Ref. 5, 8, 9, 10, 11, 14, 15, 16, and 43)

5. Spent plating and treatment solutions were discharged from the plating tanks to a treatment tank located behind Building M-1206. The neutralized wastewater from treatment tank in Building M-1206 was discharged directly to a drainage ditch which runs behind the treatment tank in a northerly direction empties into a stock pond. Occasionally, unspecified quantities of wastewater produced by a steel passivation process utilizing nitric acid and sodium dichromate were discharged without treatment to the drainage ditch. The estimated area of contamination, consisting of the drainage ditch and the stock ponds, is 3,000 square feet. (Ref. 14, 15, 16)

6. Fuel oil is stored in an above-ground 25,000 gallon tank located east of Building F-603. While digging a trench beside Building F-603, Hercules representatives reported the discovery of a concrete tank saddle and a significant amount of diesel contamination in the sub-surface soils in front of the southwest corner of the existing sulfuric acid tank. Because no tank was present at the time of discovery, the volume of the area of contamination was estimated. Based on visual observation and measurements of the area where the tank was placed, the approximate volume of contaminated soil is: 25 ft. x 5 ft. x 45 ft. = 5,625 cf = 208 cy. (Ref. 14, 15, 16, 35)

HRS REVIEW SCORE SHEET

7. The area of contamination is located in the southeast corner of the site. It is described in the preliminary RFI as a 4,800-foot diameter circle (approximately 415 acres) with a four-strand barbed wire fence around the perimeter. The burn operations take place in the center of a clay lined, bermed area that reportedly will contain a 100-year rainfall event without surface runoff. The berms are designed to prevent horizontal migration of burn residue and the clay liner is designed to prevent vertical migration of contaminants downward into the underlying soils and groundwater. The approximate area of contamination of the bermed area is: 415 ft. x 43,560 ft. = 18,077,400 sf.
(Ref. 14, 15, 16)

	SOURCE HAZARDOUS WASTE QUANTITY FACTOR WORKSHEET	SECTION 3

3. SITE HAZARDOUS WASTE QUANTITY SUMMARY TABLE

Complete the following table using the data compiled in Sections 1 and 2 of this worksheet for each of the sources at the site. Then proceed to Section 4.

Source	3.(a) Hazardous Constituent Quantity Assigned Value [from 1(c)]	(b) Hazardous Wastestream Quantity Assigned Value [from 1(f)]	(c) Source Volume Assigned Value [from 2(d)]	(d) Source Area Assigned Value [from 2(g)]	(e) Source Hazardous Waste Quantity Value* (Highest of 3a, 3b, 3c, or 3d)
1. RFI Unit # 2 - Area M X-Ray effluent receiving ditch	GW [ ] SW 0 [ ] AIR [ ] SOIL [ ]	GW 18,750 [x] SW 18,750 [x] AIR 18,750 [x] SOIL 18,750 [x]	GW N/A [ ] SW [ ] AIR [ ] SOIL [ ]	GW N/A [ ] SW [ ] AIR [ ] SOIL [ ]	GW 18,750 [x] SW 18,750 [x] AIR 18,750 [x] SOIL 18,750 [x]
2. RFI Unit # 4 - Area R Acid contamination site	GW 0 [ ] SW [ ] AIR [ ] SOIL [ ]	GW 0.26 [x] SW 0.26 [x] AIR 0.26 [ ] SOIL 0.26 [x]	GW N/A [ ] SW [ ] AIR [ ] SOIL [ ]	GW N/A [ ] SW [ ] AIR [ ] SOIL [ ]	GW 0.26 [x] SW 0.26 [x] AIR [ ] SOIL 0.26 [x]
3. RFI Unit # 5 - Area M Evaporation ponds	GW 0 [ ] SW [ ] AIR [ ] SOIL [ ]	GW 0 [ ] SW [ ] AIR [ ] SOIL [ ]	GW 0 [ ] SW [ ] AIR [ ] SOIL [ ]	GW 461.54 [x] SW 461.54 [x] AIR [ ] SOIL 461.54 [x]	GW 461.54 [x] SW 461.54 [x] AIR 461.54 [ ] SOIL 461.54 [x]
4. RFI Unit # 6 - Area G Pesticide dump	GW 0 [ ] SW [ ] AIR [ ] SOIL [ ]	GW 0 [ ] SW [ ] AIR [ ] SOIL [ ]	GW 0 [ ] SW [ ] AIR [ ] SOIL [ ]	GW 28.18 [x] SW 28.18 [x] AIR 28.18 [x] SOIL 28.18 [x]	GW 28.18 [x] SW 28.18 [x] AIR 28.18 [x] SOIL 28.18 [x]
Unallocated Source	GW [ ] SW [ ] AIR [ ]	GW [ ] SW [ ] AIR [ ]			GW [ ] SW [ ] AIR [ ]

* Do not round to the nearest integer

** Round the sum to the nearest integer, except: If the sum is > 0 but < 1, round it to 1.

The sum of the source hazardous waste quantities = Site Hazardous Waste Quantity Value**

GW [ ]
SW [ ]
AIR Continued [ ]
SOIL [ ]

	SOURCE HAZARDOUS WASTE QUANTITY FACTOR WORKSHEET	SECTION 3

3. SITE HAZARDOUS WASTE QUANTITY SUMMARY TABLE

Complete the following table using the data compiled in Sections 1 and 2 of this worksheet for each of the sources at the site. Then proceed to Section 4.

Source	3.(a) Hazardous Constituent Quantity Assigned Value [from 1(c)]	(b) Hazardous Wastestream Quantity Assigned Value [from 1(f)]	(c) Source Volume Assigned Value [from 2(d)]	(d) Source Area Assigned Value [from 2(g)]	(e) Source Hazardous Waste Quantity Value* (Highest of 3a, 3b, 3c, or 3d)
5. RFI Unit # 7 - Area M Conversion coating treatment tank	GW 0 [ ] SW [ ] AIR [ ] SOIL [ ]	GW 0 [ ] SW [ ] AIR [ ] SOIL [ ]	GW 0 [ ] SW [ ] AIR [ ] SOIL [ ]	GW 230.77 [x] SW [ ] AIR 230.77 [x] SOIL 230.77 [x]	GW 230.77 [x] SW [ ] AIR 230.77 [x] SOIL 230.77 [x]
6. RFI Unit # 8 - Area F Diesel contamination site	GW 0 [ ] SW [ ] AIR [ ] SOIL [ ]	GW 0 [ ] SW [ ] AIR [ ] SOIL [ ]	GW 0.08 [x] SW [ ] AIR 0.08 [x] SOIL 83.33 [x]	GW N/A [ ] SW [ ] AIR [ ] SOIL [ ]	GW 0.08 [x] SW [ ] AIR 0.08 [x] SOIL 83.33 [x]
7. RFI Unit #1 - Area S Explosive Classification Disposal	GW [ ] SW 0 [ ] AIR [ ] SOIL [ ]	GW [ ] SW 0 [ ] AIR [ ] SOIL [ ]	GW 0 [ ] SW [ ] AIR [ ] SOIL [ ]	GW [ ] SW [ ] AIR 531.69 [x] SOIL 531.69 [x]	GW [ ] SW [ ] AIR 531.69 [x] SOIL 531.69 [x]
	GW [ ] SW [ ] AIR [ ] SOIL [ ]	GW [ ] SW [ ] AIR [ ] SOIL [ ]	GW [ ] SW [ ] AIR [ ] SOIL [ ]	GW [ ] SW [ ] AIR [ ] SOIL [ ]	GW [ ] SW [ ] AIR [ ] SOIL [ ]
Unallocated Source	GW [ ] SW [ ] AIR [ ]	GW [ ] SW [ ] AIR [ ]			GW [ ] SW [ ] AIR [ ]

* Do not round to the nearest integer

** Round the sum to the nearest integer, except: If the sum is > 0 but < 1, round it to 1.

The sum of the source hazardous waste quantities = Site Hazardous Waste Quantity Value**

GW	19,472	[x]
SW	19,240	[x]
AIR	20,002.26	[x]
SOIL	20,085	[x]

	SOURCE HAZARDOUS WASTE QUANTITY FACTOR WORKSHEET	SECTION 4

4. From 3(e) list the site hazardous waste quantity value for each pathway and then assign the appropriate hazardous waste quantity factor value from Table 2-6.

SITE HAZARDOUS WASTE QUANTITY VALUE [From 3(e)]		HAZARDOUS WASTE QUANTITY FACTOR VALUE* (Table 2-6)
Groundwater Pathway	1.94×10^4	10,000
Surface Water Pathway	1.92×10^4	10,000
Air Pathway	2.00×10^4	10,000
Soil Exposure Pathway	2.01×10^4	10,000

HRS REVIEW SCORE SHEETS

GROUNDWATER MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors	Max Value	HRS Value Assigned	References and Comments
Likelihood of Release			
1. Observed Release	550	0	No observed release has been identified.
2. Potential to Release [lines 2a x (2b + 2c + 2d)]	500	430	
a. Containment (Table 3-2)	10	10	X-Ray effluent was deposited directly to ditch. (Ref.16)
b. Net Precipitation (Figure 3-2)(Table 3-4)	10	3	The HRS Table 3-4 has a factor value for this area which is 3. (Ref. 1)
c. Depth to Aquifer (Table 3-5)	5	5	The surficial aquifer is very shallow, 7-10 feet from the surface. (Ref.5,12,14,15,16)
d. Travel Time (Table 3-7)	35	35	Depth to aquifer is less than 10 ft. (Ref. 1)
• Hydraulic Conductivity (Table 3-6)	10^{-2} cm/sec	10^{-6}	The soils are compacted, silty clays. (Ref. 6,12,14,15,16)
• Thickness of Lowest Hydraulic Conductivity Layer	> 500 feet	0	The surficial aquifer is unconfined. (Ref. 14, 15 & 16)
3. Likelihood of Release (higher of lines 1 or 2)	550	430	
Waste Characteristics			
4. Toxicity/Mobility	10,000	1×10^4	Cadmium

HRS REVIEW SCORE SHEETS

GROUNDWATER MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors	Max Value	HRS Value Assigned	References and Comments
5. Hazardous Waste Quantity (Table 2-6)	1×10^6	1×10^4	(See hazardous waste quantity work sheets)
• Waste Characteristics Product (lines 4 x 5) (go to line 6)	1×10^8	1×10^8	
6. Waste Characteristics (Table 2-7)	100	100	
Targets			
7. Nearest Well (Table 3-11)	50	0	See comment # 8
8. Population (lines 8a + 8b + 8c)	N/A	0	
8a. Level I Concentrations	N/A	0	(See Table 1)
8b. Level II Concentrations	N/A	0	(See Table 1)
8c. Potential Contamination	N/A	0	(See Table 2)
9. Resources (HRS Section 3.3.3)	5	5	A value of 5 is assigned for the surficial aquifer. See comment # 9.
10. Wellhead Protection Area	20	0	No wellhead protection area has been identified.
11. Targets (lines 7 + 8 + 9 + 10)*	N/A	5	
Groundwater Migration Pathway Score			
12. Aquifer Score [(lines 3 x 6 x 11)/82,500]*	100	2.61	
13. Groundwater Pathway Score (S_{gw})*	100	2.61	

* Do not round to the nearest integer

8. No drinking water wells have been identified in the surficial aquifer. (Ref. 6, 15, 16, 18)

HRS REVIEW SCORE SHEETS

GROUNDWATER PATHWAY CALCULATIONS

TABLE I POPULATION - ACTUAL CONTAMINATION					
Well Identifier	**Containinant Detected**	**Concentration Level I or Level II**	**(A) Population**	**(B) Level Multiplier***	**(A x B)**
* Multipliers • Level I = 10 • Level II = 1		Groundwater Population Targets Actual Contamination Values		Sum (A/B) Level I Sum (A/B) Level II	

Reference/Comment: No drinking water wells have been identified.

GROUNDWATER PATHWAY CALCULATIONS

TABLE 2 POPULATION - POTENTIAL CONTAMINATION				
Distance (miles)	Population	Distance - Weighted Population Value Karst (Table 3-12)	Population	Distance - Weighted Population Value Other Than Karst (Table 3-12)
0 to 1/4				
> 1/4 to 1/2				
> 1/2 to 1				
> 1 to 2				
> 2 to 3				
> 3 to 4				
		Sum _____		Sum _____

Potential Contamination = $\frac{\text{Sum of Distance-Weighted Population Values}}{10}$ = _____*

* If < 1, do not round to the nearest integer; if ≥ 1, round to the nearest integer.

Reference/Comment: No drinking water wells have been identified. (Ref. 19,26,27,37,39)

HRS REVIEW SCORE SHEET

9. The surficial aquifer is used for irrigation. (Ref. 5, 12, 14, 15, 16, 20)

HRS REVIEW SCORE SHEETS

SURFACE WATER PATHWAY CALCULATIONS
Overland/Flood Migration Component

Table 3
SURFACE WATER MIGRATION PATHWAY SUMMARY

Surface Water Segment	Distance (miles)		Surface Water Descriptor (Table 4-13)	Flow (cfs)/Depth (ft) (Table 4-13)	Dilution Weight Table 4-13)
	Start	End			
1. Harris Creek River	0.00	11.0	Large stream to river	2,500 cfs	0.001
2. South Bosque River	11.00	13.75	Large river	80,000 cfs	0.0001
3. Lake Waco	13.75	15.00	Lake	155,000 cfs	0.00001
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					

Reference/Comments: See comment # 10.

10. Flow rates were based on visual observation made by EnSafe/Allen & Hoshall personnel on 12/1/92 and Corps of Engineers data for all rivers. The flow rate for Harris Creek is reportedly 2,500 cfs. According to the Army Corps of Engineers, the flow rate for the South Bosque River below Lake Waco is approximately 80,000 cfs, but this changes in drought conditions. According to the HRS II Final Rule Section 4.1.2.3.1, for a lake which has surface water flow entering the lake, assign a dilution weight based on the sum of the average annual flow for the surface water bodies entering the lake up to the point of the intake. The surface water flow rate for the North Bosque River is 75,000 cfs. The surface water flow rate for South Bosque River is 80,000 cfs. These 2 surface water body flow rates are added together and the value is 155,000 cfs. (Ref. 1, 18, 32)

HRS REVIEW SCORE SHEETS

SURFACE WATER MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors Overland/Flood Migration Component	Max Value	HRS Value Assigned	References and Comments
DRINKING WATER THREAT Likelihood of Release			
1. Observed Release	550	0	No observed release has been established.
2. Potential to Release [lines 2a x (2b + 2c)]	500	310	
a. Containment (Table 4-2)	10	10	See comment # 11.
b. Runoff (Table 4-6)	25	25	See comment # 12.
• 2 year, 24-hour rainfall (inches)	>3.5	4.0	2 yr., 24-hour rainfall map. (Ref. 4)
• Soil Group (Table 4-4)		D	The soil type for this area is fine silty clays/loams. (Ref. 14,15,16)
• Rainfall/Runoff Value (Table 4-5)	6	6	
c. Distance to Surface Water (Table 4-7)	25	6	See comment # 13.
3. Potential to Release by Flood (lines 3a x 3b)	500	500	
a. Containment (flood) (Table 4-8)	10	10	See comment # 14.
b. Flood Frequency (Table 4-9)	50	50	See comment # 15.
4. Potential to Release (lines 2 + 3) (maximum of 500)	500	500	
5. Likelihood of Release (higher of lines 1 or 4)	550	500	
Waste Characteristics			
6. Toxicity/Persistence (Table 4-12)	10,000	1×10^4	Cadmium
7. Hazardous Waste Quantity (Table 2-6)	1×10^6	1×10^4	(See hazardous waste quantity work sheet)
8. Waste Characteristics (Table 2-7)	100	100	
• (lines 6 x 7) (go to line 8)	1×10^8	1×10^8	

11. Wastes were discharged directly to the drainage ditches via the respective outfalls. There is no built-in containment for the drainage systems, therefore, contaminants went directly into the soil. A containment value of 10 has been assigned. (Ref. 3, 8, 14, 15, 16)

12. The topographic maps were used to calculate the drainage area of NWIRP McGregor, which is 9,700 acres (Ref. 18)

13. The distance from the facility perimeter to the probable point of entry on Harris Creek is approximately 3,000 feet. The topographic map, along with visual observations, was used to approximate this distance. (Ref. 18 and 35)

14. During the HRS site visit, no structures protecting the x-ray effluent drainage area from flooding were observed. The drainage ditch collects and discharges precipitation from NWIRP McGregor to Harris Creek, Station Creek, and the South Bosque River. (Ref. 35)

15. The x-ray effluent ditch floods on a regular basis and receives drainage from the NWIRP storm sewer system. NWIRP McGregor personnel stated that teh ditch is dry except during precipitation events. (Ref. 35)

HRS REVIEW SCORE SHEETS

SURFACE WATER MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors	Max Value	HRS Value Assigned	References and Comments
Targets			
9. Nearest Intake (higher of lines 9a, 9b or 9c)	50	0	No intakes have been identified in the 15-mile downstream limit
a. Level I Concentrations	50	0	(See Table 4)
b. Level II Concentrations	45	0	(See Table 4)
c. Potential Contamination (20 x dil wt)[1] (Table 4-13)	20	0	(See Table 4)
10. Population (lines 10a + 10b +10c)*	N/A	0	
a. Level I Concentrations	N/A	0	(See Table 4A)
b. Level II Concentrations	N/A	0	(See Table 4A)
c. Potential Contamination	N/A	0	(See Table 5)
11. Resources	5	5	Potential source of irrigation and drinking water. (Ref. 14, 15)
12. Targets (lines 9 + 10 + 11)*	N/A	5	
Drinking Water Threat Score			
13. Drinking Water Threat [(lines 5 x 8 x 12)/82,500]*	100	3.03	
HUMAN FOOD CHAIN THREAT Likelihood of Release			
14. Likelihood of Release (same value as line 5)	550	500	
Waste Characteristics			
15. Toxicity/Persistence/Bioaccumulation (Table 4-16)	5×10^8	5×10^8	Chlordane

[1] Round to the nearest integer

* Do not round to the nearest integer

HRS REVIEW SCORE SHEETS

SURFACE WATER PATHWAY CALCULATIONS
Overland/Flood Migration Component

TABLE 4 DRINKING WATER TARGETS Nearest Intake - Potential Contamination			
Intake	Concentration Level I or Level II	Flow (cfs)/ (Table 4-13)	(A) Dilution Weight (Table 4-13)

Nearest intake Level I Contamination Value = 50
Nearest intake Level II Contamination Value = 45
Nearest intake Potential Contamination Value = [A x 20]* = _____

* Round to the nearest integer

Reference/Comment: No intakes have been identified within 15-mile downstream limit.

SURFACE WATER PATHWAY CALCULATIONS
Overland/Flood Migration Component

TABLE 4A
DRINKING WATER TARGETS
ACTUAL CONTAMINATION - POPULATION

Intake	Contaminant Detected	Concentration Level I or Level II	(A) Population	(B) Level Multiplier*	(A x B)

* Multipliers
- Level I = 10
- Level II = 1

Drinking Water Population Targets
Actual Contamination Values

Sum (A x B) Level I

Sum (A x B) Level II

Reference/Comment: No intakes have been identified within 15 miles downstream.

SURFACE WATER PATHWAY CALCULATIONS
Overland/Flood Migration Component

TABLE 5 DRINKING WATER TARGETS - POTENTIAL CONTAMINATION			
Surface Water Body	**Average Stream Flow/Depth**	**Population Served by Intake(s)**	**(DWP) Dilution-Weighted Population Value (Table 4-14)**
		Sum (DWP)	

Potential Contamination = $\frac{\text{Sum (DWP)}}{10}$ = _____*

* If < 1, do not round to the nearest integer; if ≥ 1, round to the nearest integer.

Reference/Comment: No intakes have been identified within 15 downstream miles

HRS REVIEW SCORE SHEETS

SURFACE WATER MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors	Max Value	HRS Value Assigned	References and Comments
16. Hazardous Waste Quantity (same as line 7)	1×10^{6}	1×10^{4}	
17. Waste Characteristics (Table 2-7)	1000	1000	
• (Lines 15 x 16) (go to line 17)	1×10^{12}	5×10^{12}	
Targets			
18. Food Chain Individual	50	0	(See Table 6)
19. Population (lines 19a + 19b + 19c)*	N/A	3.6×10^{-5}	
a. Level I Concentrations	N/A	0	(See Table 7)
b. Level II Concentrations	N/A	0	(See Table 7)
c. Potential Contamination	N/A	3.6×10^{-5}	(See Table 8)
20. Targets (lines 18 + 19)*	N/A	3.6×10^{-5}	
Human Food Chain Threat Score			
21. Human Food Chain Threat [(lines 14 x 17 x 20)/82,500]*	100	2.18×10^{-4}	
ENVIRONMENTAL THREAT Likelihood of Release			
22. Likelihood of Release (same value as line 5)	550	500	

* Do not round to the nearest integer

SURFACE WATER PATHWAY CALCULATIONS
Overland/Flood Migration Component

TABLE 6 HUMAN FOOD CHAIN TARGETS Food Chain Individual		
Fishery Subject to Actual Contamination	**Contaminant/Concentration Level I or Level II**	**Factor Value Calculation**
Harris Creek	**Potential**	**If Level I Concentration, then factor value = 50; If Level II Concentration, then factor value = 45**

If there is a fishery present within the target distance limit not subject to Level I or II concentrations, but there is an observed release of a hazardous substance having a bioaccumulation potential factor value $\geq$ 500 to surface water in the watershed being evaluated, assign a value of 20. If there is no observed release in the watershed, or there is no observed release of a hazardous substance having a bioaccumulation potential factor value $\geq$ 500 but there is a fishery present, calculate the food chain individual factor value as follows: determine the highest dilution weight (i.e., lowest amount of dilution) applicable to the fisheries within the target distance limit. Multiply this dilution weight by 20 and round to the nearest integer.

[Dilution weight (Table 4-13) 0.001 x 20] = 0.02

If there are no fisheries within the target distance limit of the watershed, assign a value of 0.

Food Chain Individual Factor Value Assigned: 0

Reference/Comment: See comment # 16.

16. There is no observed release to the watershed. Because a fishery is present in the target distance limit, the dilution weight for Harris Creek was multiplied by 20 and rounded to the nearest integer. The rounded value is zero. (Ref. 1, 31, 32, 34)

SURFACE WATER PATHWAY CALCULATIONS
Overland/Flood Migration Component

TABLE 7
HUMAN FOOD CHAIN TARGETS
POPULATION - ACTUAL CONTAMINATION

Fishery	Contaminant Detected	Concentration Level I or Level II	Human Food Chain Production (lbs/year)	(A) Human Food Chain Population Value (Table 4-18)	(B) Level Multiplier*	(A x B)

* Multipliers
- Level I = 10
- Level II = 1

Human Food Chain Population Targets
Actual Contamination Values

Sum (A x B) Level I

Sum (A x B) Level II

Reference/Comment: No analytical data are available.

SURFACE WATER PATHWAY CALCULATIONS
Overland/Flood Migration Component

TABLE 8
HUMAN FOOD CHAIN TARGETS
Population - Potential Contamination

Fishery	Human Food Chain Production (lb/year)	(P) Human Food Chain Population Value (Table 4-18)	Average Stream Flow/Depth at Fishery	(DW) Dilution Weighting Factor (Table 4-13)	(P x DW)
Harris Creek	100	0.03	2,500 cfs	0.001	3×10^{-5}
South Bosque River	100	0.03	80,000 cfs	0.0001	3×10^{-6}
Lake Waco	350	0.3	155,000 cfs	0.00001	3×10^{-6}
				Sum (P x DW)	3.6×10^{-5}

Potential Contamination = $\frac{\text{Sum (P x DW)}}{10} = \frac{3.6 \times 10^{-5}}{}$ *

* If < 1, do not round to the nearest integer; if ≥ 1, round to the nearest integer

Reference/Comment: See comment # 17.

17. It has been assumed that the stream and rivers composing the in-water segment serve as fisheries. It has also been assumed that each leg of the in-water segment produces greater than zero pounds of fish per year. After significant debate regarding the lack of available documentation, it was determined that it would be unreasonable to assume that these water bodies did not harbor fish or no one fishes in them. According to the HRS Rules, any number from 1 to 100 lbs. of fish per year will yield the same Human Food Chain Population Factor Value from Table 4-18 which is 0.03. For Lake Waco, the value of fish per lb. was estimated toward the conservative side by Fish and Wildlife officials to be approximately 350 lb. per year. (Ref. 18, 32, 35)

HRS REVIEW SCORE SHEETS

SURFACE WATER MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors	Max Value	HRS Value Assigned	References and Comments
Waste Characteristics			
23. Ecosystem Toxicity/Persistence/ Bioaccumulation (Table 4-21)	5×10^{8}	5×10^{8}	Chlordane
24. Hazardous Waste Quantity (same as line 7)	1×10^{6}	1×10^{4}	
25. Waste Characteristics (Table 2-7)	1000	1000	
• (lines 23 x 24) (go to line 25)	1×10^{12}	5×10^{12}	
Targets			
26. Sensitive Environments (lines 26a + 26b + 26c)*		1.008×10^{-1}	
a. Level I Concentrations	N/A	0	(See Tables 9 and 9A)
b. Level II Concentrations	N/A	0	(See Tables 9 and 9A)
c. Potential Contamination	N/A	1.008×10^{-1}	(See Table 10)
27. Target (lines 26a + 26b + 26c)*	N/A	1.008×10^{-1}	
Environmental Threat Score			
28. Environmental Threat [(lines 22 x 25 x 27)/82,500]*†	60	0.61	
Overland/Flood Migration Component Score or a Watershed			
29. Watershed Score * (lines 13 + 21 + 28)	100	3.64	
30. Overland/Flood Migration Component Score* (highest score from line 29 for all watersheds evaluated)	100	3.64	See comment # 19.

* Do not round to the nearest integer

† This value is subject to a maximum of 60.

HRS REVIEW SCORE SHEETS

SURFACE WATER PATHWAY CALCULATIONS
Overland/Flood Migration Component

TABLE 9
ENVIRONMENTAL TARGETS
Actual Contamination - Other Than Wetlands

Sensitive Environment (other than wetlands)	Contaminant Detected	Concentration Level I or Level II	(A) Sensitive Environments Rating Value (Table 4-23)	(B) Level Multiplier*	(A x B)
* Multipliers • Level I = 10 • Level II = 1		Environmental Targets Actual Contamination Values		Sum (A x B) Level I Sum (A x B) Level II	

Reference/Comment: No analytical data are available.

SURFACE WATER PATHWAY CALCULATIONS
Overland/Flood Migration Component

TABLE 9A
ENVIRONMENTAL TARGETS
ACTUAL CONTAMINATION - WETLANDS

Wetland	Contaminant Detected	Concentration Level I or Level II	Length of Wetlands (miles)	(C) Wetlands Rating Value (Table 4-24)	(D) Level Multiplier*	(C x D)

* Multipliers
- Level I = 10
- Level II = 1

Wetland Targets Actual Contamination Values

Sum (C x D) Level I

Sum (C x D) Level II

Actual Contamination - Level I Targets = [Sum (A x B) Level I] + [Sum (C x D) Level I] = _____

Actual Contamination - Level II Targets = [Sum (A x B) Level II] + [Sum (C x D) Level II] = _____

Reference/Comment: No analytical data are available.

SURFACE WATER PATHWAY CALCULATIONS
Overland/Flood Migration Component

TABLE 10
ENVIRONMENTAL TARGETS - POTENTIAL CONTAMINATION

Sensitive Environment	(A) Assigned Rating Value (Table 4-23)	Flow/ Depth	(B) Dilution Weight Table 4-13	(A x B)	Length of Wetlands (miles)	(C) Wetlands Rating Value (Table 4-24)	Flow/ Depth	(D) Dilution Weight (Table 4-13)	(C x D)
Blackland Prairie	50	10,000	0.001	0.05					
Cross-timbers Prairies	75	10,000	0.001	0.075					
Attwater chicken	50	10,000	0.001	0.05					
S. Bald eagle	100	10,000	0.001	0.1					
Mexican duck	50	10,000	0.001	0.05					
Black ferret	75	10,000	0.001	0.075					
Black-capped virio	100	10,000	0.001	0.1					
Texas horned lizard	75	10,000	0.001	0.075					
			Sum (A x B)	cont.				Sum (C x D)	cont.

Potential Contamination = $\frac{\text{Sum (A x B)} + \text{Sum (C x D)}}{10}$ = _____*

* If < 1, do not round to the nearest integer; if ≥ 1, round to the nearest integer.

Reference/Comment: See comment # 18.

SURFACE WATER PATHWAY CALCULATIONS
Overland/Flood Migration Component

TABLE 10
ENVIRONMENTAL TARGETS - POTENTIAL CONTAMINATION

Sensitive Environment	(A) Assigned Rating Value (Table 4-23)	Flow/ Depth	(B) Dilution Weight (Table 4-13)	(A x B)	Length of Wetlands (miles)	(C) Wetlands Rating Value (Table 4-24)	Flow/ Depth	(D) Dilution Weight (Table 4-13)	(C x D)
Wetlands - 1					0.25	25	10,000	0.001	0.025
Wetlands - 2					0.50	25	10,000	0.001	0.025
Wetlands - 3					1.00	25	10,000	0.001	0.025
Wetlands - 4					2.00	50	10,000	0.001	0.025
Wetlands - 5					0.50	25	10,000	0.001	0.025
Wetlands - 6					0.62	25	10,000	0.001	0.025
Wetlands - 7					0.43	25	10,000	0.001	0.025
Wetlands - 8					9.00	250	10,000	0.001	0.25
Wetlands - 9					1.23	50	100,000	0.0001	0.005
Wetlands - 10					8.50	250	100,000	0.00001	0.0025
Wetlands - 11					0.50	25	100,000	0.00001	0.00025
			Sum (A x B)	continued				Sum (C x D)	continued

Potential Contamination = $\frac{\text{Sum (A x B)} + \text{Sum (C x D)}}{10}$ = _____*

* If < 1, do not round to the nearest integer; if ≥ 1, round to the nearest integer.

Reference/Comment: See comment # 18.

SURFACE WATER PATHWAY CALCULATIONS
Overland/Flood Migration Component

TABLE 10
ENVIRONMENTAL TARGETS - POTENTIAL CONTAMINATION

Sensitive Environment	(A) Assigned Rating Value (Table 4-23)	Flow/ Depth	(B) Dilution Weight (Table 4-13)	(A x B)	Length of Wetlands (miles)	(C) Wetlands Rating Value (Table 4-24)	Flow/ Depth	(D) Dilution Weight (Table 4-13)	(C x D)
Wetlands - 12					0.25	25	100,000	0.00001	0.00025
Wetlands - 13					0.03	0	100,000	0.00001	0
			Sum (A x B)	0.575				Sum (C x D)	0.433

Potential Contamination = $\frac{\text{Sum (A x B)} + \text{Sum (C x D)}}{10}$ = 0.1008 *

* If < 1, do not round to the nearest integer; if ≥ 1, round to the nearest integer.
Reference/Comment: See comment # 18.

18. In evaluating the endangered species in the area, the U. S. Fish & Wildlife Serve and the Texas Wildlife Heritage Society were consulted. Species not listed as either endangered or threatened were not evaluated because these agencies felt there were insufficient data to support their consideration. No species were considered to live within NWIRP McGregor boundaries since no data supports their existence. (Ref. 14, 15, 16, 17, 18, 28, 35)

    In considering wetlands, National Wetlands Inventory maps were examined. It was assumed these maps accurately portrayed wetlands that would be defined by HRS criteria in the areas of NWIRP McGregor. (Ref. 17)

19. The groundwater to surface water component has not been evaluated. Therefore, the Overland/Flood migration component score constitutes the surface water pathway score.

HRS REVIEW SCORE SHEETS - SOIL EXPOSURE PATHWAY SCORESHEET

Factor Categories and Factors	Max Value	HRS Value Assigned	References and Comments
RESIDENT POPULATION THREAT Likelihood of Release			
1. Likelihood of Exposure	550	550	See comment # 20.
Waste Characteristics			
2. Toxicity x Hazardous Waste Quantity (go to line 3)	1×10^8	1×10^8	(See Hazardous Waste Quantity Worksheets)
• Toxicity	10,000	10,000	Chromium
3. Waste Characteristics (Table 2-7)	100	100	
Targets			
4. Resident Individual	50	0	There are no individuals living on the NWIRP property. (Ref.14,15,16,36)
5. Resident Population (lines 5a + 5b)	N/A	0	
a. Level I Concentrations	N/A	0	(See Table 19)
b. Level II Concentrations	N/A	0	(See Table 19)
6. Workers (Table 5-4)	15	5	Two facility employees were noted working in or around the drainage ditches. Although this is not a permanent position for these workers, they have occassion to be in or around the ditch areas. (Ref. 14, 15)
7. Resources (HRS Section 5.1.3.4)	5	5	Livestock graze near the contaminated sources. (Ref. 14,15,16)
8. Terrestrial Sensitive Environments* (Table 5-5)	N/A	0	No terrestrial sensitive environments have been identified. (Ref. 14,15,16)
9. Targets (lines 4 + 5 + 6 + 7 + 8)**	N/A	10	

* Multiply lines 1 x 3 x 8 and divide the product by 82,500. If the result if $\leq$ 60, assign the terrestrial sensitive environments targets value as calculated. If the result is > 60, assign a targets value for the terrestrial sensitive environments as follows:

$$\frac{(60)\ (82{,}500)}{(\text{line 1})\ (\text{line 3})}$$

Please note that a pathway score based solely on terrestrial sensitive environments is limited to a maximum of 60.

** Do not round to the nearest integer.

20. The drainage ditches were noted in the field and on topographic maps to be approximately 1.5 feet across and 850 - 1,000 feet in length, on average. Based on soil sampling analysis from the Remedial Facility Investigation (in progress), the areas which show soil contamination within 0-24 inches are the sources examined. Based on a strict interpertation of HRS II criteria, an area of observed contamination has been established. (Ref. 1, 8, 16, 18, 35 and 42)

HRS REVIEW SCORE SHEETS

SOIL EXPOSURE PATHWAY CALCULATIONS

TABLE 19 RESIDENT POPULATION				
Contaminant Detected	Concentration Level I or Level II	(A) Population	(B) Level Multiplier*	(A x B)
* Multipliers • Level I = 10 • Level II = 1	Soil Exposure Resident Population Targets Values		5a. Sum (A x B) Level I 5b. Sum (A x B) Level II	

Reference/Comment: There are no residents on the NWIRP McGreagor property. (Ref. 14, 15, 16)

SOIL EXPOSURE PATHWAY SCORESHEET

Factor Categories and Factors	Max Value	HRS Value Assigned	References and Comments
10. Resident Population Threat** (lines 1 x 3 x 9)	N/A	550,000	
NEARBY POPULATION THREAT Likelihood of Release			
11. Likelihood of Exposure (Table 5-8)	500	50	
• Attractiveness/Accessibility (Table 5-6)	100	5	See comment # 21.
• Area of Contamination (Table 5-7)	100	100	See comment # 22.
Waste Characteristics			
12. Toxicity x Hazardous Waste Quantity (from line 2)	1×10^8	1×10^8	
13. Waste Characteristics (from line 3)	100	100	
Targets			
14. Nearest Individual (Table 5-9)	1	0	Access to the facility is limited/restricted by the fence and guards. (Ref,14,15,16)
15. Population Within One Mile	N/A	0	(See Table 20)
16. Targets (lines 14 + 15)*	N/A	0	
17. Nearby Population Threat* (lines 11 x 13 x 16)	N/A	0	
18. Soil Exposure Pathway Score (S_s)* [lines (10 + 17)/82,500]	100	6.67	

* Do not round to the nearest integer
** Do not round to the nearest integer

21. NWIRP McGregor is surrounded by a fence and is guarded. (Ref. 5, 6, 7, 9, 11, 14, 15, 16)

Source RFI Unit #2:

The drainage ditches were noted in the field and on topographic maps to be approximately 1.5 feet across and from 850 - 1,000 feet in length on average. Sediment samples have not been analyzed. Therefore, the area is assumed to be contaminated by the facts presented in the RFI and visual inspection by EnSafe/Allen & Hoshall personnel and Hercules representatives. (Ref. 8, 16, 18, 35)

Source RFI Unit #4:

See documentation on RFI unit #2 (Ref. 8, 16, 18, 35)

Source RFI Unit #5:

This site is not accessible to the general public or the workers because it is surrounded by a fence which restricts access. (Ref. 14, 15, 16)

Source RFI Unit #6:

This site is not accessible to the general public, but some workers may be exposed to the area. (Ref. 8, 16, 18, 35)

Source RFI Unit #7:

See documentation on RFI Unit #2 (Ref. 8, 16, 18, 35)

Source RFI Unit #8

Fuel oil is stored in an above ground 25,000 gallon tank located east of building F-603. While digging a trench beside building F-603, Hercules representatives reported the discovery of a concrete tank saddle and a significant amount of diesel contamination in the sub-surface soils in the front of the southwest corner of the existing sulfuric acid tank. (Ref. 14, 15, 16)

Source RFI Unit #1

The area of contamination is reported to be enclosed by a four-tier barbed wire fence which excludes transient visitors and others, including workers, when area is set to burn. (Ref. 14, 15, 16)

22. The total area of contamination is 19,052,575.00 square feet.

RFI Unit #1	18,077,400 square feet
RFI Unit #2	2,250 square feet
RFI Unit #4	300 square feet
RFI Unit #5	6,000 square feet
RFI Unit #6	958,000 square feet
RFI Unit #7	3,000 square feet
RFI Unit #8	5,625 square feet

Total = 19,052,575 square feet for area of contamination

(Ref. 1, 8, 16, 18, 35)

HRS REVIEW SCORE SHEETS

SOIL EXPOSURE PATHWAY CALCULATIONS

TABLE 20 POPULATION WITHIN ONE MILE		
Distance (miles)	**Population**	**Distance - Weighted Population Values (Table 5-10)**
0 to 1/4	0	0
> 1/4 to 1/2	0	0
> 1/2 to 1	0	0
		Sum 0

Population Within One Mile Factor Value = $\frac{\text{Sum}}{10}$ = $\frac{0}{}$ *

* If < 1, do not round to the nearest integer; if ≥ 1, round to the nearest integer.

Reference/Comment: According to David Shead, Federal Facility Coordinator, NWIRP McGregor, there are 6,500 people working on base. Since the base is enclosed by a fence and is not accessible to the general public, the outlying population is not considered. (Ref. 36)

HRS REVIEW SCORE SHEETS

AIR MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors	Max Value	HRS Value Assigned	References and Comments
Likelihood of Release			
1. Observed Release	550	0	No observed release has been documented for this pathway.
2. Potential to Release (higher of lines 2a or 2b)	500	360	
2a. *Gas Potential to Release*	500	360	*Calculated in PREscore program*
2b. Particulate Potential to Release	500	330	Calculated in PREscore program
3. Likelihood of Release (higher of lines 1 or 2)	550	360	
Waste Characteristics			
4. Toxicity/Mobility (Table 6-13)	10,000	1000	Calculated in PREscore program
5. Hazardous Waste Quantity (Table 2-6)	1×10^6	1×10^4	(See hazardous waste quantity worksheet)
• Waste Characteristics Product (lines 4 x 5) (go to line 6)	1×10^{12}	1×10^7	
6. Waste Characteristics (Table 2-7)	100	56	

HRS REVIEW SCORE SHEETS

AIR MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors	Max Value	HRS Value Assigned	References and Comments
Targets			
7. Nearest Individual (Table 6-16)	50	20	There are people onsite and also residents in the 1/4-mile ring. (Ref. 16)
8. Population (8a + 8b + 8c)*	N/A	105.26	
a. Level I Concentrations	N/A	0	(See Table 21)
b. Level II Concentrations	N/A	0	(See Table 21)
c. Potential Contamination	N/A	105.26	(See Table 22)
9. Resources (HRS Section 6.3.3)	5	5	Livestock graze on land adjacent to the base. (Ref. 15)
10. Sensitive Environments** (lines 10a + 10b)	N/A	0.2675	
a. Actual Contamination	N/A	0	(See Table 23)
b. Potential Contamination	N/A	0.2675	(See Table 24)
11. Targets (lines 7 + 8 + 9 + 10)*	N/A	130.53	
12. Air Pathway Score (S_a)* [(lines 3 x 6 x 11)/82,500]	100	31.90	

* Do not round to the nearest integer

** Multiply lines 3 x 6 x 10 and divide the product by 82,500. If the results is $\leq$ 60, assign the sensitive environments targets value as calculated. If the result is > 60, assign a targets value for the sensitive environments as follows:

(60) (82,500) Please note that a pathway score based solely on sensitive environments is
(line 3)(line 6) limited to a maximum of 60

TABLE 21 POPULATION Actual Contamination				
Contaminant Detected	Concentration Level I or Level II	(A) Population	(B) Level Multiplier*	(A x B)
			8a. Sum (A x B) Level I	
* Multipliers • Level I = 10 • Level II = 1	Air Population Targets Actual Contamination Values		8b. Sum (A x B) Level II	

Reference/Comment: There are no analytical data available.

AIR PATHWAY CALCULATIONS

TABLE 22
POPULATION - POTENTIAL CONTAMINATION

Distance Category (miles)	Population	Distance Weighted Population Values (Table 6-17)
0	650	522
> 0 to 1/4	1,500	408
> 1/4 to 1/2	1,092	88
> 1/2 to 1	1,518	26
> 1 to 2	1,031	8
> 2 to 3	200	0.4
> 3 to 4	210	0.2

Potential Contamination = $\frac{\text{Sum}}{10}$ = 105.26 *

* If < 1, do not round to the nearest integer; if ≥ 1, round to the nearest integer.

Reference/Comment: This information was acquired from Environmnetal Database, Inc. (Ref.18, 41) See Comment #23.

23. Documentation for population onsite distance category:

According to the IAS and the RFI reports for NWIRP McGregor, the number of people on the facility is 650. For the purpose of evaluating the air pathway, the number used will be the largest number of persons which could be in a specific area of contamination at any given time. This number is 650 people. (Ref. 15, 16, 36)

Documentation for population > 0 to 1/4 mile distance category:

According to the demographics study provided by Environmental Database, Inc., there are approximately 1,500 people who live in the quarter mile distance ring. (Ref. 41, 36)

Documentation for population > 1/4 to 1/2 mile distance category:

According to Environmental Database, Inc., there are 1092 people who live in the quarter to half mile distance ring. (Ref. 41)

Documentation for population > 1/2 to 1 mile distance category:

According to Environmental Database, Inc., there are approximately 1518 people who live within the half mile to 1-mile distance ring. (Ref. 41)

Documentation for population > 1 to 2 miles distance category:

According to Environmental Database, Inc., there are approximately 1031 people living in the 1 to 2 mile distance ring. (Ref. 41)

Documentation for population > 2 to 3 miles distance category:

According to Environmental Database, Inc., there are 200 people living in the 2 to 3 mile distance ring. (Ref. 41)

Documentation for population > 3 to 4 miles distance category:

According to Environmental Database, Inc., there are approximately 210 people living in the 3 to 4 mile distance ring. (Ref. 41)

3.3 PRE-score Score Sheets

HRS DOCUMENTATION RECORD
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

1. Site Name: NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
   (as entered in CERCLIS)

2. Site CERCLIS Number:

3. Site Reviewer: SANDRA J. FARMER

4. Date: 02 NOVEMBER, 1992

5. Site Location: McGREGOR/McLENNON/TEXAS
   (City/County,State)

6. Congressional District: ELEVENTH CONGRESSIONAL DISTRICT

7. Site Coordinates: Multiple

   Latitude: 31 25'00.0" Longitude: 97 25'00.0"

	Score
Ground Water Migration Pathway Score (Sgw)	2.61
Surface Water Migration Pathway Score (Ssw)	3.53
Soil Exposure Pathway Score (Ss)	6.67
Air Migration Pathway Score (Sa)	31.77
Site Score	16.38

NOTE

EPA uses the terms "facility," "site," and "release" interchangeably. The term "facility" is broadly defined in CERCLA to include any area where hazardous substances have "come to be located" (CERCLA Section 109(9)), and the listing process is not intended to define or reflect boundaries of such facilities or releases. Site names, and references to specific parcels or properties, are provided for general identification purposes only. Knowledge regarding the extent of sites will be refined as more information is developed during the RI/FS and even during implementation of the remedy.

NPL Characteristics Data Collection Form
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

Record Information

1. Site Name: NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
   (as entered in CERCLIS)

2. Site CERCLIS Number:

3. Site Reviewer: SANDRA J. FARMER

4. Date: 02 NOVEMBER, 1992

5. Site Location: McGREGOR/McLENNON/TEXAS
   (City/County,State)

6. Congressional District: ELEVENTH CONGRESSIONAL DISTRICT

7. Site Coordinates: Multiple

   Latitude: 31 25'00.0" Longitude: 97 25'00.0"

Site Description

1. Setting: Rural

2. Current Owner: Other - GOVERNMENT CONTRACTOR-HERCULES

3. Current Site Status: Site with Unknown Source

4. Years of Operation: Active Site , from and to dates: 1942 - PRESENT

5. How Initially Identified: RCRA Notification

6. Entity Responsible for Waste Generation:

   - Other - GOVERNMENT CONTRACTOR
   - Federal Facility
   - Military

7. Site Activities/Waste Deposition:

   - Surface Impoundment
   - Waste Piles
   - Tanks - Below Ground

Waste Description

8. Wastes Deposited or Detected Onsite:

- Solvents
- Acids/Bases
- Paints/Pigments
- Explosives
- Pesticides/Herbicides
- Metals

Response Actions

9. Response/Removal Actions:

RCRA Information

10. For All Active Facilities, RCRA Site Status:

- -90 Day Accumulator

Demographic Information

11. Workers Present Onsite: Yes

12. Distance to Nearest Non-Worker Individual: > 1/4 - 1/2 Mile

13. Residential Population Within 1 Mile: 3845.0

14. Residential Population Within 4 Miles: 5286.0

Water Use Information

15. Local Drinking Water Supply Source:

- Other -
- Ground Water (within 4 mile distance limit)

16. Total Population Served by Local Drinking Water Supply Source: 33000.0

17. Drinking Water Supply System Type for Local Drinking Water Supply Sources:

- Municipal (Services over 25 People)
- Private

18. Surface Water Adjacent to/Draining Site:

- Other - STATION, HARRIS, S.BOSQUE CRK.

%

WASTE QUANTITY
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

4. PATHWAY HAZARDOUS WASTE QUANTITY AND WASTE CHARACTERISTICS SUMMARY TABLE

Migration Pathway	Contaminant Values		HWQVs*	WCVs**
Ground Water	Toxicity/Mobility	1.00E+04	10000	100
SW: Overland Flow, DW	Tox./Persistence	1.00E+04	10000	100
SW: Overland Flow, HFC	Tox./Persis./Bioacc.	5.00E+08	10000	1000
SW: Overland Flow, Env	Etox./Persis./Bioacc.	5.00E+08	10000	1000
SW: GW to SW, DW	Tox./Persistence	1.00E+04	10000	100
SW: GW to SW, HFC	Tox./Persis./Bioacc.	5.00E+07	10000	560
SW: GW to SW, Env	Etox./Persis./Bioacc.	5.00E+06	10000	320
Soil Exposure:Resident	Toxicity	1.00E+04	10000	100
Soil Exposure: Nearby	Toxicity	1.00E+04	10000	100
Air	Toxicity/Mobility	1.00E+03	10000	56

* Hazardous Waste Quantity Factor Values
** Waste Characteristics Factor Category Values

Note: SW = Surface Water
GW = Ground Water
DW = Drinking Water Threat
HFC = Human Food Chain Threat
Env = Environmental Threat

WASTE QUANTITY
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

3. SITE HAZARDOUS WASTE QUANTITY SUMMARY

No.	Source ID	Migration Pathways	Vol. or Area Value (2e)	Constituent or Wastestream Value (2f,2h)	Hazardous Waste Qty. Value (2k)
1	RFI UNIT # 2	GW-SW-SE-A	6.62E-02	1.88E+05	1.88E+05
2	RFI UNIT # 4	GW-SW-SE	8.82E-03	2.60E-01	2.60E-01
3	RFI UNIT # 6	GW-SW-SE-A	2.82E+01	0.00E+00	2.82E+01
4	RFI UNIT # 7	GW-SW-SE-A	2.31E+02	0.00E+00	2.31E+02
5	RFI UNIT # 8	GW	8.32E-02	0.00E+00	8.32E-02
6	RFI UNIT # 5	GW-SW-SE-A	4.62E+02	0.00E+00	4.62E+02
7	RFI UNIT # 1	SW-A	1.00E-03	0.00E+00	1.00E-03

WASTE QUANTITY
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: RFI UNIT # 1

a. Wastestream ID	
b. Hazardous Constituent Quantity (C) (lbs.)	0.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	0.00
e. Data Complete?	NO
f. Wastestream Quantity Value (W/5,000)	0.00E+00

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a. Source ID	RFI UNIT # 1
b. Source Type	Contaminated Soil
c. Secondary Source Type	Burn Pit
d. Source Volume (yd3) | Source Area (ft2)	2.50 | 18077400.00
e. Source Volume/Area Value	1.00E-03
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	0.00E+00
g. Data Complete?	NO
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	0.00E+00
i. Data Complete?	NO
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	1.00E-03

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
Chlorobenzene	< 2	YES	0.0E+00	ppm
Toluene	< 2	YES	0.0E+00	ppm
Trichloroethane, 1,1,1-	< 2	YES	0.0E+00	ppm

Documentation for Source Type:

The area is located in the southeast corner of the site. It is described as a 4,800-foot diameter circle (approximately 415 acres) with a four strand barbed wire fence arround the perimeter. The burn opperations take place in the center of a clay lined, bermed area that will reportedly contain a 100-year rainfall event without surface runoff. The berms are designed to prevent horizontal migration of burn residue. Conversely, the clay liner is designed to prevent vertical migration of contaminants downward into the underlying soils and groundwater. This calculates to approximately 18,077,400.00 square feet in contaminated bermed area.

Reference: 1,14,15,16

Documentation for Source Hazardous Substances:

Although the exact materials disposed of and the quanities are unknown, the materials reportedly burned in this area include: Toluene, 1,1,1 Trichloroethane, Chlorinated benzenes, Ammonium perchlorate, ammonium nitrate based explosives and various solvents used for clean-up operations during manufacturing of explosives.

Reference: 14,15,16

Documentation for Source Volume:

The burn pit area has been in operation since 1942, and is still active. However, the amount of material burned is unknown. For this reason we have estimated towards the conservative end of the spectrum relative to NWIRP McGregor. This figure is 100 pounds per year. In multiplying this number of 100 pounds per year, by the number of years of operation (50), the total number of pounds burned would be 5,000. This number divided by the HRS II conversion factor of 2,000 pounds equalling 1 cubic yard yields a number of 2.5 cubic yards.

Reference: 14,15,16,1

Documentation for Source Area:

The area is located in the southeast corner of the site. It is described as a 4,800-foot diameter circle (approximately 415 acres) with a four-strand barbed wire fence around the permeter. The burn operations take place in the center of a clay lined, bermed area that will reportedly contain a 100-year rainfall event without surface runoff. The berms are designed to prevent horizontal migration of burn residue. Conversersly, the clay liner is designed to prevent verticl migration of contaminants downward into the underlying soils and groundwater. This calculates to approximately 18,077,400.00 square feet. 415 x 43,560 sf/ac = 18,077,400 square feet/acre.

Reference: 14,15,16

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: RFI UNIT # 2

a. Wastestream ID	X-RAY, SILVER
b. Hazardous Constituent Quantity (C) (lbs.)	0.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	937500000.0
e. Data Complete?	YES
f. Wastestream Quantity Value (W/5,000)	1.88E+05

Documentation for Wastestream Quantity:

IN THE EARLY 1960'S ROCKETDYNE BEGAN OPERATING THE NONDISTRUCTIVE TESTING EQUIPMENT. THEY BEGAN DISCHARGING APPROXIMATELY 1500-GALLONS/DAY, 5 DAYS PER WEEK, OF EFFLUENT INTO THE DITCH. THE REVIEW OF RECORDS HAVE INDICATED THAT A SILVER RECOVERY UNIT WAS NOT USED UNTIL 1979. This equals approximately 93,750,000 pounds of probable constituent deposited.
7500 x 50 weeks x 25 years equals the number given above.

Reference: 3, 5, 16

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a. Source ID	RFI UNIT # 2
b. Source Type	Contaminated Soil
c. Secondary Source Type	N.A.
d. Source Volume (yd3) | Source Area (ft2)	0.00 | 2250.00
e. Source Volume/Area Value	6.62E-02
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	0.00E+00
g. Data Complete?	NO
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	1.88E+05
i. Data Complete?	YES
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	1.88E+05

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
Chromium	< 2	NO	0.0E+00	ppm
Silver	< 2	NO	9.3E+01	ppm

Documentation for Source Type:

IN THE EARLY 1960'S ROCKETDYNE BEGAN OPERATING THE NONDISTRUCTIVE TESTING EQUIPMENT. THEY BEGAN DISCHARGING APPROXIMATELY 1500-GALLONS/DAY, 5-DAYS/WEEK, OF EFFLUENT INTO THE DITCH. THE REVIEW OF RECORDS HAVE INDICATED THAT A SILVER RECOVERY UNIT WAS NOT USED UNTIL 1979.

Reference: 3, 5, 16

Documentation for Source Hazardous Substances:

This information was obtained from the IAS and the RFI reports. Additional information has been obtained from work which is in progress on the RFI Workplan.

Reference: 15,16 and 42

Documentation for Source Area:

This information was obtained from the IAS and the RFI reports.

Reference: 15,16

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: RFI UNIT # 4

a. Wastestream ID	ACID CONTAMINATION
b. Hazardous Constituent Quantity (C) (lbs.)	0.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	1300.00
e. Data Complete?	NO
f. Wastestream Quantity Value (W/5,000)	2.60E-01

Documentation for Wastestream Quantity:

Acid etching of steel motor cases was occassionally performed in the area during the 1970's. This activity was conducted every other year and reportedly generated from 15 to 20 gallons of acid bearing waste which was dumped out on the ground behind building R-1601. T his would be calculated by taking the actual years of operational dumping, which was 10 years, and multiplying by the average total number of gallons of acid dumped during the year, which was 13. The total number of gallons dumped on the ground is calculated to be 130.
From a worker onsite the actual number of gallons ranged from 8 to 18 . This is number average I used to calculate the waste quanitity value.

Reference: 5,,14,15,16

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a. Source ID	RFI UNIT # 4
b. Source Type	Contaminated Soil
c. Secondary Source Type	N.A.
d. Source Volume (yd3) | Source Area (ft2)	0.00 | 300.00
e. Source Volume/Area Value	8.82E-03
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	0.00E+00
g. Data Complete?	NO
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	2.60E-01
i. Data Complete?	NO
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	2.60E-01

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
Chromium	< 2	NO	3.0E+01	ppm
Lead	< 2	NO	2.5E+01	ppm
Nickel	< 2	NO	1.8E+02	ppm
Nitric acid	< 2	YES	0.0E+00	ppm
Sodium	< 2	YES	0.0E+00	ppm
Zinc	< 2	NO	2.7E+02	ppm

Documentation for Source Type:

ACID ETCHING OF STEEL MOTOR CASE WAS OCCASIONALLY PERFORMED IN THE AREA DURING THE 1970'S. THIS ACTIVITY WAS CONDUCTED EVERY OTHER YEAR AND REPORTEDLY GENERATED FROM 15 TO 20 GALLONS OF ACIDS BEARING WASTE WHICH WAS DUMPED OUT ON THE GRROUND BEHIND BUILDING R-1601.

Reference: 14, 15, 16

Documentation for Source Hazardous Substances:

Various samples have been taken for the RFI workplan and these samples analyses are listed in the HRS II documentation package. The highest number listed from all the sample analysis was used as numerical documentation for this sample area in RFI unit # 4.

Reference: 5,14,15,16,42

Documentation for Source Area:

Estimation for this figure came from the Hercules representative.

Reference: 35

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: RFI UNIT # 5

a. Wastestream ID	
b. Hazardous Constituent Quantity (C) (lbs.)	0.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	0.00
e. Data Complete?	NO
f. Wastestream Quantity Value (W/5,000)	0.00E+00

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a. Source ID	RFI UNIT # 5
b. Source Type	Surface Impoundment
c. Secondary Source Type	N.A.
d. Source Volume (yd3) | Source Area (ft2)	0.00 | 6000.00
e. Source Volume/Area Value	4.62E+02
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	0.00E+00
g. Data Complete?	NO
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	0.00E+00
i. Data Complete?	NO
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	4.62E+02

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
Barium	< 2	NO	2.5E+02	ppm
Chromium	< 2	NO	3.1E+03	ppm
Lead	< 2	NO	2.3E+03	ppm
Toluene	< 2	NO	1.6E-01	ppm
Trichloroethane, 1,1,2-	< 2	NO	7.6E-01	ppm
Zinc	< 2	NO	1.8E+03	ppm

Documentation for Source Type:

LIMITED QUANITIES OF WASTEWATER WERE GENERATED FROM PROPELLANT PROCESSING ACTIVITIES LOCATED IN THE BUILDINGS M-1217 AND M-1227. THE WASTEWATER WAS DISCHARGED INTO SMALL EVAPORATION PONDS LOCATED BETWEEN THE BUILDINGS. NORMALLY, THESE PONDS DID NOT DISCHARGE, BUT OVERFLOW FROM THE PONDS WAS PIPED TO A DRAINAGE DITCH WHICH FLOWS TO THE SOUTH AND EVENTUALLY ENDS UP IN A TRIBUTARY TO STATION CREEK.

Reference: 14, 15, 16

Documentation for Source Hazardous Substances:

The samples collected from the evaporation ponds which make up RFI unit # 5, have been listed in reference number 42. This information states that the majority of the analyzed constituents were metals, which were collected within 0 - 6" of the ground surface.

Reference: 42

Documentation for Source Area:

An EnSafe/Allen and Hoshall employee and the representative for hercules took visual size measurements and concluded the size of the twoo ponds to be 6000 square feet.

Reference: 5,8,14,15,16,35

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: RFI UNIT # 6

a. Wastestream ID	
b. Hazardous Constituent Quantity (C) (lbs.)	0.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	0.00
e. Data Complete?	NO
f. Wastestream Quantity Value (W/5,000)	0.00E+00

Documentation for Wastestream Quantity:

Reference:

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a. Source ID	RFI UNIT # 6
b. Source Type	Contaminated Soil
c. Secondary Source Type	N.A.
d. Source Volume (yd3) | Source Area (ft2)	0.00 | 958000.00
e. Source Volume/Area Value	2.82E+01
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	0.00E+00
g. Data Complete?	NO
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	0.00E+00
i. Data Complete?	NO
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	2.82E+01

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
Aldrin	< 2	NO	7.0E+02	ppm
Chlordane	< 2	NO	0.0E+00	ppm
DDD	< 2	NO	2.0E+03	ppm
DDE	< 2	NO	1.2E+04	ppm
DDT	< 2	NO	5.8E+05	ppm
Dieldrin	< 2	NO	7.0E+02	ppm
Endosulfan (I or II)	< 2	NO	7.0E+02	ppm
Endosulfan sulfate	< 2	NO	7.0E+02	ppm
Endrin	< 2	NO	7.0E+02	ppm
Ferrous sulfate	< 2	NO	0.0E+00	ppm
Heptachlor	< 2	NO	7.0E+02	ppm
Hexachlorocyclohexane, delta-	< 2	NO	0.0E+00	ppm
Parathion, ethyl-	< 2	NO	0.0E+00	ppm
Toxaphene	< 2	NO	1.4E+04	ppm

Documentation for Source Type:

THE PESTICIDE DUMP IS LOCATED IN AREA G AND IS DESCRIBED AS AN AREA 60 FEET WIDE BY 600 FEET LONG BETWEEN THE PERIMETER ROAD AND THE BOUNDARY FENCE. THE CHEMICAL USED IN AREA G OPERATED BY CIBA-GEIGY COMPANY. OPERATION INCLUDED THE FORMULATION OF DDT, TOXAPHENE, PAPRTHION, SULFUR, ALDRIN-DIELDRIN, CHLORADANE-HEPTACHLOR, BHC-LINDANE, AND ENDRIN. However, there has been additional information which states that surface contamination around Building 704 and 705 is substantial. ERM-Southwest,Inc., states in its Draft RFI Report, that at the interval of 0-1 foot, there are large areas which contain pesticide contamination. These areas added to the existing 60 x 600 foot dump area make the surface area contaminated by pesticides approximately 958,000 square feet.

Reference: 5,8,9,10,11,14,15,16, and 43

Documentation for Source Hazardous Substances:

The results indicated that the primary pesticide is DDT, however other pesticides were also found to be present. Toxaphene, benzene-hexachloride (BHC), aldrin, dieldrin, endrin, heptachlor and daughter compounds of DDT.

These results were obtained from a sample collected by Hercules at the footing construction east of building 704. It will be assumed that this contamination is the result of migration of contamination associated with RFI unit #6.

Reference: 15,16,11

Documentation for Source Area:

The pesticide dump is located in Area G and is described as an area 6 0 feet wide by 600 feet long between the perimeter road and the boun dary fence. However, there has been additional information which states that surface contamination around Building 704 is substantial. ERM-Southwest, Inc., states in its Draft RFI Report, that at the interval of 0-1 foot, there are large areas which contain pesticide contamination. These areas added to the existing 60 x 600 foot dump area make the surface area contaminated by

pesticides approximately 958,000 square feet.

Reference: 5,8,9,10,11,14,15,16, and 43

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: RFI UNIT # 7

a. Wastestream ID	PLATING SOLUTION
b. Hazardous Constituent Quantity (C) (lbs.)	0.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	0.00
e. Data Complete?	NO
f. Wastestream Quantity Value (W/5,000)	0.00E+00

Wastestream Constituent Hazardous Substances	Concent.	Units	Liquid	Qualifier
Arsenic	0.0E+00	ppb	NO	0
Barium	0.0E+00	ppb	NO	
Cadmium	0.0E+00	ppb	NO	
Chromium	0.0E+00	ppb	NO	
Copper	0.0E+00	ppb	NO	
Cyanide	0.0E+00	ppb	NO	
Lead	0.0E+00	ppb	NO	
Nickel	0.0E+00	ppb	NO	
Nitric acid	0.0E+00	ppb	NO	
Zinc	0.0E+00	ppb	NO	

Documentation for Constituents:

There is evidence that the plating solutions were dumped here after they went through pre-treatment, but there are is no data to substaniate if contamination is present.

Reference: 14,15,16

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a. Source ID	RFI UNIT # 7
b. Source Type	Surface Impoundment
c. Secondary Source Type	N.A.
d. Source Volume (yd3) | Source Area (ft2)	0.00 | 3000.00
e. Source Volume/Area Value	2.31E+02
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	0.00E+00
g. Data Complete?	NO
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	0.00E+00
i. Data Complete?	NO
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	2.31E+02

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
Arsenic	< 2	NO	2.8E+01	ppm
Cadmium	< 2	NO	0.0E+00	ppm
Chromium	< 2	NO	5.2E+03	ppm
Chromium(VI)	< 2	NO	0.0E+00	ppm
Lead	< 2	NO	7.8E+01	ppm
Nickel	< 2	NO	4.6E+01	ppm
Nitric acid	< 2	NO	0.0E+00	ppm
Sodium	< 2	NO	0.0E+00	ppm
Zinc phosphide	< 2	NO	4.4E+03	ppm

Documentation for Source Type:

SPENT PLATING AND TREATMENT SOLUTIONS WERE DISCHARGED TO A TREATMENT TANK LOCATED BEHIND BUILDING M-1206. WASTEWATER FROM PROCESS RINSE TANKS IN BUILDING M-1206 WAS DISCHARGED DIRECTLY TO A DRAINAGE DITCH WHICH RUNS BEHIND THE TREATMENT TANK IN A NORTHERLY DIRECTION EMPTYING INTO A STOCK POND. OCCASSIONALLY, UNSPECIFIED QUANITIES OF WASTEWATER PRODUCED BY A STEEL PASSIVATION PROCESS UTILIZING NITRIC

ACID AND SODIUM DICHROMATE WERE DISCHARGED WITHOUT TREATMENT TO THE DRAINAGE DITCH.

Reference: 14, 15, 16

Documentation for Source Hazardous Substances:

These contaimnants have been established as being disposed of in this area. There are a listing of the contaminants and the analytical values in reference 42. The vaules chosen in the chart are the values which were the highest values for each of the constituents presented.

Reference: 42

Documentation for Source Area:

The proposed area of contamination covered approximately 3000 square feet. This area being the drainage ditch to the stock ponds inclusive. All of this information is speculative due to visual measurements taken at the site visit of 11/30/92 by EnSafe and Hercules personnel.

Reference: 14,15,16,35

WASTE QUANTITY
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: RFI UNIT # 8

a. Wastestream ID	DIESEL FUEL
b. Hazardous Constituent Quantity (C) (lbs.)	0.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	0.00
e. Data Complete?	NO
f. Wastestream Quantity Value (W/5,000)	0.00E+00

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a. Source ID	RFI UNIT # 8
b. Source Type	Contaminated Soil
c. Secondary Source Type	N.A.
d. Source Volume (yd3) | Source Area (ft2)	208.00 | 0.00
e. Source Volume/Area Value	8.32E-02
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	0.00E+00
g. Data Complete?	NO
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	0.00E+00
i. Data Complete?	NO
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	8.32E-02

Documentation for Source Type:

FUEL OIL IS STOCKED IN AN ABOVE-GROUND 25,000 GALLON TANK LOCATED EAST OF BUILDING F-603. WHILE DIGGING A TRENCH BESIDES BUILDING F-603, HERCULES REPRESENTATIVES REPORTED THE DISCOVERY OF A CONCRETE TANK SADDLE AND A SIGNIFICANT AMOUNT OF DIESEL CONTAMINATION IN THE SUB-SURFACE SOILS IN THE FRONT OF THE SOUTHWEST CORNER OF THE EXISTING SULFURIC ACID TANK.

Reference: 14, 15, 16

Documentation for Source Volume:

Because no tank was present at the time of discovery, the volume of the area was taken. By visual observation and measurements of the area where the tank was placed (25 feet x 5 feet x 45 feet) and the volume was approximated at 208 cubic yards.

Reference: 14,15,16,35

GROUND WATER MIGRATION PATHWAY SCORESHEET
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

GROUND WATER MIGRATION PATHWAY Factor Categories & Factors	Maximum Value	Value Assigned
Likelihood of Release to an Aquifer Aquifer: SURFICIAL AQUIFER		
1. Observed Release	550	0
2. Potential to Release		
2a. Containment	10	10
2b. Net Precipitation	10	3
2c. Depth to Aquifer	5	5
2d. Travel Time	35	35
2e. Potential to Release [lines 2a(2b+2c+2d)]	500	430
3. Likelihood of Release	550	430
Waste Characteristics		
4. Toxicity/Mobility	*	1.00E+04
5. Hazardous Waste Quantity	*	10000
6. Waste Characteristics	100	100
Targets		
7. Nearest Well	50	0.00E+00
8. Population		
8a. Level I Concentrations	**	0.00E+00
8b. Level II Concentrations	**	0.00E+00
8c. Potential Contamination	**	0.00E+00
8d. Population (lines 8a+8b+8c)	**	0.00E+00
9. Resources	5	5.00E+00
10. Wellhead Protection Area	20	0.00E+00
11. Targets (lines 7+8d+9+10)	**	5.00E+00
12. Targets (including overlaying aquifers)	**	5.00E+00
13. Aquifer Score	100	2.61
GROUND WATER MIGRATION PATHWAY SCORE (Sgw)	100	2.61

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

GROUND WATER PATHWAY AQUIFER SUMMARY
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

No.	Aquifer ID	Type	Overlaying No.	Inter-Connected with	Likelihood of Release	Targets
1	SURFICIAL AQUIFER	Non K	0	0	430	5.00E+00

Containment

No.	Source ID	HWQ Value	Containment Value
1	RFI UNIT # 2	1.88E+05	10
2	RFI UNIT # 4	2.60E-01	10
3	RFI UNIT # 6	2.82E+01	10
4	RFI UNIT # 7	2.31E+02	10
5	RFI UNIT # 8	8.32E-02	10
6	RFI UNIT # 5	4.62E+02	10
	Containment Factor		10

Documentation for Ground Water Containment, Source RFI UNIT # 2:

The solvents in most cases were dumped or poured onto the ground into an open ditch.

Reference: 14,15,16

Documentation for Ground Water Containment, Source RFI UNIT # 4:

Acid etching of steel motor cases was occasionally performed in t he area during the 1970's. This activity was conducted every other year and reportedly generated from 15 to 20 gallons of acid bearing waste which were dumped out on the ground behind building R-1601. T his would be calculated by taking the actual years of operational dumping, which was 10 years, and mulitplying by the number of gallons of acid dumped during the year, which was 13.

Reference: 5,14,15,16,

Documentation for Ground Water Containment, Source RFI UNIT # 6:

At the time of the 1979 study, it was felt that significant concentrations of pesticidee were only 6-8 inches deep. However, two deeper soil samples indicated that pesticide concentration were slightly higher at 42 inches deep than at 24 inches. This in combination with the type of soils in the area (vertsoils) makes it very difficult to believe no groundwater pollution is possible.

Reference: 5,8,9,10,11,14,15,16

Documentation for Ground Water Containment, Source RFI UNIT # 7:

The neutralized supernatant was discharged to the drainage area behind the treatment tank. Ocassionally, unspecified quanties of wastewater produced by a steel passiation process utilizing nitric acid and some sodium dochromate were discharged discharged without treatment to the drainage ditch.

Reference: 14,15,16

Documentation for Ground Water Containment, Source RFI UNIT # 8:

While digging a trench besides building F-603, Hercules representatives reported the discovery of a concrete tank saddle and a significant ammount of diesel contamination in the sub-surface soils. Because no tank was present at the time of discovery, the amount of fuel is unknown.

Reference: 14,15,16

Documentation for Ground Water Containment, Source RFI UNIT # 5:

Limited quanitites of wastewater were generated from propellant processes and dischraged to the evaporation ponds. These ponds were not lined, therefore the groundwater could be contaminated by vertical disemination of water.

Reference: 6,20,21,22,23,14,15,16

Documentation for Ground Water Containment, Source RFI UNIT # 1:

The area of concern is located n the outheast corner of the site. It is described as a 4,800-foot diameter circle (approximately 415 acres) with a 4-strand barbed wire fence around the permete. The burn operations takes place in the center of a clay lined, bermed area that reportedly will contain a 100-year rainfall event without surface runoff. The berms are designed to prevent horizontal migration of burn residue. Conversely, the clay liner is designed to prevent vertical migration of contaminants downward into the underlying soils and groundwater.

Reference: 14,15,16

Net Precipitation

Net Precipitation (inches)	0.00

Documentation for Net Precipitation:

The total precipation for this region is 39.1 inches of rain per year. Due to the large amount of evaporation due to drought conditions which exist during the warmer months of the year, the net precipation value would be 15 inches per year. This number corresponds to a factor value of 3 in the PRESCORE program. This value was assigned from Figure 3-2 of Reference 1.

Reference: 1, Figure 3-2,14,15,16

Aquifer: SURFICIAL AQUIFER

Type of Aquifer: Non Karst

Overlaying Aquifer: 0

Interconnected with: 0

Documentation for SURFICIAL AQUIFER Aquifer:

The geologic units within the boundary of the NWIRP-McGREGOR site is Comanchean series is divided into three groups from the oldest to the youngest; the Trinity group, the Fredericksburg group, and the Washita group. Only the Washita group crops out in the vicinity of the NWIRP-McGregor site.

The Georgian formation is the only formation which makes up the Washita group outcrop at the site. The Georgian formation is divided into seven units from the oldest to the youngest: Kiamichi, Duck Creek, Fort Worth Limestone, Denton Marl, Weno Limestone, Pawpaw Shale, and Main Street Limestone. The two oldest units, Kiamichi and Duck Creek, do not crop out in the area of the site. The other units of the Georgian formation do crop out within the boundary of the site.

FORT WORTH LIMESTONE- The Fort Worth Limestone is twenty-two feet thick in the McGregor Quadrangle. It consists of fairly uniform, nodular limestone with interbedded thin shale layers.

DENTON MARL- The Denton Marl is approximately six feet thick in the McGregor Quadrangle. It is composed of dark gray soft marl which has several discontinuous thin limestone ledges near the center.

WENO LIMESTONE- The Weno Limestone in the McGregor Quadrangle is approximately thirty-six feet thick. The upper seventeen feet consist of nodular, bedded limestone with alternating thin marl beds. The lower nineteen feet have several unconsolidated marl beds. The base of the Weno Limestone is a very resistant limestone ledge known as the Ocee ledge and is easily differentiated from the underlying Denton formation.

PAWPAW SHALE- The Pawpaw Shale bed is seven feet thick in the McGregor Quadrangle. The Pawpaw Shale unit weathers into three zones. The top and the bottom two feeet contain marly limestone that is easily weathered, while the middle three feet weather less quickly and remain as a resistant ledge.

MAIN STREET LIMESTONE- The Main Street Limestone is about thirty-five feet thick in the McGregor Quadrangle. The Main Street Limestone consists of medium hard, resistent, white, fine to medium crystalline, nodular limestone. The lower limit of the Main Street Limestone is marked by the Marly, less resistant beds of the Pawpaw Shale member.

Upon weathering, all the outcropping units of the Georgetown formation, exclusive of the Main Street Limestone, which is already hard and impermeable, become impermeable. This is a result of the clays in these units which are released during weathering. These clays form an effective seal to downward percolation of water.

The geologic formations underlying the site are relatively flat. These beds have a dip of twenty to twenty-five feet per mile to the southeast and a strike of north six degrees.

SOILS- The soils of the Grand Prairie, in which the site is located, are residual soils which have developed from the underlying limestones and marl. The soils of the site are characterized by a mixture of deep and shallow clays on limestone. The dominant soils are dark reddish-brown to dark-brown clays of the Crawford Series and Purves Series. These soils can be classified as vertisols, and expand and contract in relation to the soil moisture. When wet, the clay content of these soils provide a fairly impermeable barrier to downward leaching. However, when these soils dry out, they develop vertical cracks which could extend to the shallow underlying bedrock. The depth of soil over the bedrock is variable, but seldom exceeds five or six feet.

THE CRAWFORD SERIES
The Crawford Series is made up of dark-brown to reddish-brown noncalcareous clays. These clays are similar to the Denton soils in many respects, but are finer textured, somewhat less grayish, and usually more reddish in the subsoil. The Crawford Series soils are well drained with to medium runoff. They are slightly susceptable to erosion. Permeability of these soils is less than 0.06 inches per hour, which is classified as very slow. However, when dry and cracked the permeability is rapid. The clay content ranges from 40-60 percent. The shrink-swell potential for these soils is rated as very high, meaning a volume change of more than nine percent is possible.

PURVES SERIES-
The Purves Series is made up of alkaline, dark-brown gravelly silty clay with limestone fragments. This series of soil is well drained. Permeability is moderately slow. These soils are similar to Crawford Series soils with slow to medium surface runoff. The Purves Series soils are moderately erodible. The surface is sticky.

Reference: 3 - PAGES 7 THROUGH 12

OBSERVED RELEASE

No.	Well ID	Well Type	Distance (miles)	Level of Contamination
- N/A and/or data not specified				

Observed Release Factor 0

Documentation for Well :

No observed releases have been documented in the surficial aquifer.

Reference:

POTENTIAL TO RELEASE

Containment

Containment Factor	10	

Net Precipitation

Net Precipitation Factor	3	

Depth to Aquifer

A. Depth of Hazardous Substances	3.00	feet

Documentation for Depth of Hazardous Substances:

The contaminants were deposited directly onto the soil via draina ge pipes reported in the IAS and the RFI. Therefore, a containment value of 10has been assigned to this area.

Reference: 14,15,16

B. Depth to Aquifer from Surface	7.00	feet

Documentation for Depth to Aquifer from Surface :

The most important factor at NWIRP McGregor in reference to the geology is the soils. these soils are vertisoils. When saturation occurs after a rain, these soils serve as a very effective barrier to the downward migration of contaminants. This is a result of the high clay content in these soils, which ranges from 35-65 percent. H owever, when these soils become dry, which readily occurs in this portion of central Texas, they develop vertical cracks which provide ready access for contaminants to reach the groundwater. Also of significance is the shallow groundwater or high water table which occurs throughout the site, some 15-20 feet below the surface. This

makes the presence of vertisoils soils even more important, as contaminants could very quickly reach the shallow groundwater through the vertical cracks in the soil.

Reference: 12,14,15,16

C. Depth to Aquifer (B - A)	4.00	feet
Depth to Aquifer Factor	5	

Travel Time

Are All Layers Karst?	NO

Documentation for Karst Layers:

THE PAWPAW SHALE BED IS 7 FEET THICK IN THE McGREGOR QUADRANGLE. THE PAWPAW UNIT WEATHERS INTO THREE DISTINCT ZONES. THE TOP AND BOTTOM 2 FEET CONTAIN MARLY LIMESTONE THAT IS EASILY WEATHERED, WHILE THE MIDDLE 3 FEET WEATHER LESS QUICKLY AND REMAIN AS A RESISTENT LEDGE. THE PAWPAW CROPS OUT IN ISOLATED AREAS THROUGHOUT THE McGREGOR SITE.

Reference: 16

Thickness of Layer(s) with Lowest Conductivity	7.00	feet

Documentation for Thickness of Layers with Lowest Conductivity:

Transmissivity values were calculated using methods described by Driscoll (1986) for evaluating recovery data. The results are summerized in the reference area below.

Reference: 15,16

Hydraulic Conductivity (cm/sec)	1.0E-06
Travel Time Factor	35
Potential to Release Factor	430

Source: 1 RFI UNIT # 2

Source Hazardous Waste Quantity Value: 187500.00

Hazardous Substance	Toxicity Value	Mobility Value	Toxicity/ Mobility Value
Chromium	10000	1.00E-02	1.00E+02
Silver	1000	2.00E-07	2.00E-04

Source: 2 RFI UNIT # 4

Source Hazardous Waste Quantity Value: 0.26

Hazardous Substance	Toxicity Value	Mobility Value	Toxicity/ Mobility Value
Chromium	10000	1.00E-02	1.00E+02
Lead	10000	2.00E-05	2.00E-01
Nickel	10000	2.00E-05	2.00E-01
Nitric acid	100	1.00E+00	1.00E+02
Sodium	100	1.00E-02	1.00E+00
Zinc	10	2.00E-03	2.00E-02

Source: 3 RFI UNIT # 6

Source Hazardous Waste Quantity Value: 28.18

Hazardous Substance	Toxicity Value	Mobility Value	Toxicity/ Mobility Value
Aldrin	10000	2.00E-07	2.00E-03
Chlordane	10000	2.00E-07	2.00E-03
DDD	100	2.00E-07	2.00E-05
DDE	100	2.00E-07	2.00E-05
DDT	1000	2.00E-07	2.00E-04
Dieldrin	10000	2.00E-07	2.00E-03
Endosulfan (I or II)	10000	2.00E-05	2.00E-01
Endosulfan sulfate	100	1.00E-02	1.00E+00
Endrin	10000	2.00E-07	2.00E-03
Ferrous sulfate	10	1.00E-02	1.00E-01
Heptachlor	1000	2.00E-05	2.00E-02
Hexachlorocyclohexane, delta-	1000	2.00E-03	2.00E+00
Parathion, ethyl-	100	2.00E-03	2.00E-01
Toxaphene	1000	2.00E-05	2.00E-02

Source: 4 RFI UNIT # 7

Source Hazardous Waste Quantity Value: 230.77

Hazardous Substance	Toxicity Value	Mobility Value	Toxicity/ Mobility Value
Arsenic	10000	1.00E-02	1.00E+02
Barium	10000	1.00E-02	1.00E+02
Cadmium	10000	1.00E+00	1.00E+04
Chromium	10000	1.00E-02	1.00E+02
Chromium(VI)	10000	1.00E-02	1.00E+02
Copper	100	1.00E-02	1.00E+00
Cyanide	100	2.00E-05	2.00E-03
Lead	10000	2.00E-05	2.00E-01
Nickel	10000	2.00E-05	2.00E-01
Nitric acid	100	2.00E-05	2.00E-03
Sodium	100	1.00E-02	1.00E+00
Zinc	10	2.00E-03	2.00E-02
Zinc phosphide	10000	2.00E-03	2.00E+01

Source: 5 RFI UNIT # 8

Source Hazardous Waste Quantity Value: 0.08

Hazardous Substance	Toxicity Value	Mobility Value	Toxicity/ Mobility Value

Source: 6 RFI UNIT # 5

Source Hazardous Waste Quantity Value: 461.54

Hazardous Substance	Toxicity Value	Mobility Value	Toxicity/ Mobility Value
Barium	10000	1.00E-02	1.00E+02
Chromium	10000	1.00E-02	1.00E+02
Lead	10000	2.00E-05	2.00E-01
Toluene	10	1.00E-02	1.00E-01
Trichloroethane, 1,1,2-	1000	1.00E-02	1.00E+01
Zinc	10	2.00E-03	2.00E-02

Hazardous Substances Found in an Observed Release

Well No.	Observed Release Hazardous Substance	Toxicity Value	Mobility Value	Toxicity/ Mobility Value

- N/A and/or data not specified

Toxicity/Mobility Value from Source Hazardous Substances:	1.00E+04
Toxicity/Mobility Value from Observed Release Hazardous Substances:	0.00E+00
Toxicity/Mobility Factor:	1.00E+04
Sum of Source Hazardous Waste Quantity Values:	1.88E+05
Hazardous Waste Quantity Factor:	10000
Waste Characteristics Factor Category:	100

Population by Well

No.	Well ID	Sample Type	Distance (miles)	Level of Contamination	Population
- N/A and/or data not specified					

Level I Population Factor: 0.00

Level II Population Factor: 0.00

Potential Contamination by Distance Category

Distance Category (miles)	Population	Value
> 0 to 1/4	0.0	0.00E+00
> 1/4 to 1/2	0.0	0.00E+00
> 1/2 to 1	0.0	0.00E+00
> 1 to 2	0.0	0.00E+00
> 2 to 3	0.0	0.00E+00
> 3 to 4	0.0	0.00E+00

Potential Contamination Factor: 0.000

Documentation for Target Population > 0 to 1/4 mile Distance Category:

No populations are documented to obtain their drinking water from the surficial aquifer.

Reference: 19; 26; 27; 37; 39

Documentation for Target Population > 1/4 to 1/2 mile Distance Category:

Please see the 0 to 1/4 mile note.

Reference:

Documentation for Target Population > 1/2 to 1 mile Distance Category:

Please see the 0 to 1/4 mile note.

Reference:

Documentation for Target Population > 1 to 2 miles Distance Category:

Please see the 0 to 1/4 mile note.

Reference:

Documentation for Target Population > 2 to 3 miles Distance Category:

Please see the 0 to 1/4 mile note.

Reference:

Documentation for Target Population > 3 to 4 miles Distance Category:

Please see the 0 to 1/4 mile note.

Reference:

Nearest Well

Level of Contamination: N.A.

Nearest Well Factor: 0.00E+00

Documentation for Nearest Well:

NWIRP McGregor has water production wells located on the base and within the 4-mile radius of the base. Thes wells tap the Hensel aquifer, which is protected by a large confining layer.

Reference: 5,15,16,18

Resources

Resource Use: YES

Resource Factor: 5.00E+00

Documentation for Resources:

A value of 5 is assigned to the surficial aquifer because it is used for irrigation and watering of livestock.

Reference: 14, 15, 16

Wellhead Protection Area

No wellhead protection area

Wellhead Protection Area Factor: 0.00E+00

Documentation for Wellhead Protection Area:

No wellhead protection areas have been identified in this region.

Reference: 14, 15, 16

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 12/14/92

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors DRINKING WATER THREAT	Maximum Value	Value Assigned
Likelihood of Release		
1. Observed Release	550	0
2. Potential to Release by Overland Flow		
2a. Containment	10	10
2b. Runoff	25	25
2c. Distance to Surface Water	25	6
2d. Potential to Release by Overland Flow [lines 2a(2b+2c)]	500	310
3. Potential to Release by Flood		
3a. Containment (Flood)	10	10
3b. Flood Frequency	50	7
3c. Potential to Release by Flood (lines 3a x 3b)	500	70
4. Potential to Release (lines 2d+3c)	500	380
5. Likelihood of Release	550	380
Waste Characteristics		
6. Toxicity/Persistence	*	1.00E+04
7. Hazardous Waste Quantity	*	10000
8. Waste Characteristics	100	100
Targets		
9. Nearest Intake	50	0.00E+00
10. Population		
10a. Level I Concentrations	**	0.00E+00
10b. Level II Concentrations	**	0.00E+00
10c. Potential Contamination	**	0.00E+00
10d. Population (lines 10a+10b+10c)	**	0.00E+00
11. Resources	5	5.00E+00
12. Targets (lines 9+10d+11)	**	5.00E+00
13. DRINKING WATER THREAT SCORE	100	2.30

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 12/14/92

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors HUMAN FOOD CHAIN THREAT	Maximum Value	Value Assigned
Likelihood of Release		
14. Likelihood of Release (same as line 5)	550	380
Waste Characteristics		
15. Toxicity/Persistence/Bioaccumulation	*	5.00E+08
16. Hazardous Waste Quantity	*	10000
17. Waste Characteristics	1000	1000
Targets		
18. Food Chain Individual	50	0.00E+00
19. Population		
19a. Level I Concentrations	**	0.00E+00
19b. Level II Concentrations	**	0.00E+00
19c. Pot. Human Food Chain Contamination	**	3.16E-04
19d. Population (lines 19a+19b+19c)	**	3.16E-04
20. Targets (lines 18+19d)	**	3.16E-04
21. HUMAN FOOD CHAIN THREAT SCORE	100	0.00

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 12/14/92

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors ENVIRONMENTAL THREAT	Maximum Value	Value Assigned
Likelihood of Release		
22. Likelihood of Release (same as line 5)	550	380
Waste Characteristics		
23. Ecosystem Toxicity/Persistence/Bioacc.	*	5.00E+08
24. Hazardous Waste Quantity	*	10000
25. Waste Characteristics	1000	1000
Targets		
26. Sensitive Environments		
26a. Level I Concentrations	**	0.00E+00
26b. Level II Concentrations	**	0.00E+00
26c. Potential Contamination	**	1.11E-01
26d. Sensitive Environments (lines 26a+26b+26c)	**	1.11E-01
27. Targets (line 26d)	**	1.11E-01
28. ENVIRONMENTAL THREAT SCORE	60	0.51
29. WATERSHED SCORE	100	2.81
30. SW: OVERLAND/FLOOD COMPONENT SCORE (Sof)	100	2.81

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

SURFACE WATER PATHWAY SEGMENT SUMMARY
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 12/14/92

No.	Segment ID	Segment Type	Water Type	Start Point (mi)	End Point (mi)	Average Flow (cfs)
1	HARRIS CREEK RIVER	Mixing Are	Fresh	0.00	11.00	2500
2	SOUTH BOSQUE CREEK	River	Fresh	11.00	13.75	80000
3	LAKE WACO	Lake	Fresh	13.75	15.00	100050

SURFACE WATER PATHWAY OVERLAND FLOW/FLOOD COMPONENT LIKELIHOOD OF RELEASE
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 12/14/92

OBSERVED RELEASE

No.	Sample ID	Sample Type	Distance (miles)	Level of Contamination DW	HFC	Env

- N/A and/or data not specified

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POTENTIAL TO RELEASE

Potential to Release by Overland Flow

Containment

No.	Source ID	HWQ Value	Containment Value

Containment Factor:	1
Containment Factor:	2
Containment Factor:	3
Containment Factor:	4
Containment Factor:	6

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Distance to Surface Water

Distance to Surface Water Factor: 0

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Runoff

Documentation for Distance to Surface Water:

The distance from the base perimeter to the potential point of entry on Harris Creek is approximately 3000 feet. The topographic map was used to approximate this distance along with a visual observation.

Reference: 18,35

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Documentation for Drainage Area:

This information is obtained from Ciba-Geigy's pesticide report of 22 August 1991. This information was provided in a memo to Mr. Jeff Bennett on October 7, 1991

Reference: 5

doc here

Documentation for Rainfall:

This information is taken from the U.S.Department of Commerce's Technical paper number 40. The information is estimated.

Reference: 4

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Documentation for Soil Group:

Information based on IAS and RFI reports.

Reference: 15,16

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Potential to Release by Overland Flow Factor: 25

SURFACE WATER PATHWAY OVERLAND FLOW/FLOOD COMPONENT LIKELIHOOD OF RELEASE
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 12/14/92

Potential to Release by Flood

No.	Source ID		HWQ Value	Flood Containment Value	Flood Frequency Value	Potential to Release by Flood
310						
bF	tF	F	6.04E-154	5888	9618	3906

Potential to Release by Flood Factor: 1
Potential to Release by Flood Factor: 2
Potential to Release by Flood Factor: 3
Potential to Release by Flood Factor: 4
Potential to Release by Flood Factor: 6

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NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 12/14/92

NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 12/14/92

Source: 1 RFI UNIT # 2

Source Hazardous Waste Quantity Value: 14250.00

Hazardous Substance	Toxicity Value	Persistence Value	Toxicity/ Persistence Value
Chromium	10000	1.00E+00	1.00E+04
Silver	1000	1.00E+00	1.00E+03

NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 12/14/92

Source: 2 RFI UNIT # 4

Source Hazardous Waste Quantity Value: 0.26

Hazardous Substance	Toxicity Value	Persistence Value	Toxicity/ Persistence Value
Nitric acid	0	4.00E-01	0.00E+00
Sodium	0	1.00E+00	0.00E+00

NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 12/14/92

Source: 3 RFI UNIT # 6

Source Hazardous Waste Quantity Value: 10.59

Hazardous Substance	Toxicity Value	Persistence Value	Toxicity/ Persistence Value
Aldrin	10000	1.00E+00	1.00E+04
Chlordane	10000	1.00E+00	1.00E+04
DDT	1000	1.00E+00	1.00E+03
Dieldrin	10000	1.00E+00	1.00E+04
Endrin	10000	1.00E+00	1.00E+04
Ferrous sulfate	10	1.00E+00	1.00E+01
Heptachlor	1000	1.00E+00	1.00E+03
Hexachlorocyclohexane, delta-	1000	1.00E+00	1.00E+03
Parathion, ethyl-	100	1.00E+00	1.00E+02
Toxaphene	1000	1.00E+00	1.00E+03

NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 12/14/92

Source: 4 RFI UNIT # 7

Source Hazardous Waste Quantity Value: 230.77

Hazardous Substance	Toxicity Value	Persistence Value	Toxicity/ Persistence Value
Arsenic	10000	1.00E+00	1.00E+04
Barium	10000	1.00E+00	1.00E+04
Cadmium	10000	1.00E+00	1.00E+04
Chromium	10000	1.00E+00	1.00E+04
Chromium(VI)	10000	1.00E+00	1.00E+04
Copper	100	1.00E+00	1.00E+02
Cyanide	100	4.00E-01	4.00E+01
Lead	10000	1.00E+00	1.00E+04
Nickel	10000	1.00E+00	1.00E+04
Nitric acid	0	4.00E-01	0.00E+00
Sodium	0	1.00E+00	0.00E+00
Zinc	10	1.00E+00	1.00E+01
Zinc phosphide	10000	1.00E+00	1.00E+04

NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 12/14/92

Source: 6 RFI UNIT # 5

Source Hazardous Waste Quantity Value: 461.54

Hazardous Substance	Toxicity Value	Persistence Value	Toxicity/ Persistence Value

NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 12/14/92

Hazardous Substances Found in an Observed Release

Sample No.	Observed Release Hazardous Substance	Toxicity Value	Persistence Value	Toxicity/ Persistence Value

- N/A and/or data not specified

Toxicity/Persistence Value from Source Hazardous Substances:	1.00E+04
Toxicity/Persistence Value from Observed Release Hazardous Substances:	0.00E+00
Toxicity/Persistence Factor:	1.00E+04
Sum of Source Hazardous Waste Quantity Values:	1.50E+04
Hazardous Waste Quantity Factor:	10000
Waste Characteristics Factor Category:	100

Level I Concentrations

- N/A and/or data not specified

Level II Concentrations

- N/A and/or data not specified

Most Distant Level I Sample

- N/A and/or data not specified

Most Distant Level II Sample

- N/A and/or data not specified

Level I Concentrations

Intake	Distance Along the In-water Segment from the Probable Point of Entry (miles)	Population
- N/A and/or data not specified		

Population Served by Level I Intakes: 0.0

Level I Population Factor: 0.00E+00

Level II Concentrations

Intake	Distance Along the In-water Segment from the Probable Point of Entry (miles)	Population
- N/A and/or data not specified		

Population Served by Level II Intakes: 0.0

Level II Population Factor: 0.00E+00

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT DRINKING WATER THREAT TARGETS
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 12/14/92

Potential Contamination

Intake ID	Average Annual Flow (cfs)	Population Served
- N/A and/or data not specified		

Type of Surface Water Body	Total Population	Dilution-Weighted Population
- N/A and/or data not specified		

Dilution-Weighted Population Served
by Potentially Contaminated Intakes: 0.0

Potential Contamination Factor: 0.0

Nearest Intake

Location of Nearest Drinking Water Intake: N.A.

Nearest Intake Factor: 0.00

Resources

Resource Use: YES

Resource Value: 5.00E+00

Documentation for Resources:

Potential source of irrigation

Reference: 14,15,16

SW PATHWAY: OVERLAND/FLOOD HUMAN FOOD CHAIN THREAT WASTE CHARACTERISTICS
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 12/14/92

Source: 1 RFI UNIT # 2

Source Hazardous Waste Quantity Value: 14250.00

Hazardous Substance	Toxicity Value	Persistence Value	Bio-accum. Value	Toxicity/ Persistence/ Bioaccum. Value
Chromium	10000	1.00E+00	5.00E+02	5.00E+06
Silver	1000	1.00E+00	5.00E+01	5.00E+04

Source: 2 RFI UNIT # 4

Source Hazardous Waste Quantity Value: 0.26

Hazardous Substance	Toxicity Value	Persistence Value	Bio-accum. Value	Toxicity/ Persistence/ Bioaccum. Value
Nitric acid	0	4.00E-01	5.00E-01	0.00E+00
Sodium	0	1.00E+00	5.00E-01	0.00E+00

Source: 3 RFI UNIT # 6

Source Hazardous Waste Quantity Value: 10.59

Hazardous Substance	Toxicity Value	Persistence Value	Bio-accum. Value	Toxicity/ Persistence/ Bioaccum. Value
Aldrin	10000	1.00E+00	5.00E+03	5.00E+07
Chlordane	10000	1.00E+00	5.00E+04	5.00E+08
DDT	1000	1.00E+00	5.00E+04	5.00E+07
Dieldrin	10000	1.00E+00	5.00E+03	5.00E+07
Endrin	10000	1.00E+00	5.00E+03	5.00E+07
Ferrous sulfate	10	1.00E+00	5.00E-01	5.00E+00
Heptachlor	1000	1.00E+00	5.00E+03	5.00E+06
Hexachlorocyclohexane, delta-	1000	1.00E+00	5.00E+02	5.00E+05
Parathion, ethyl-	100	1.00E+00	5.00E+02	5.00E+04
Toxaphene	1000	1.00E+00	5.00E+04	5.00E+07

SW PATHWAY: OVERLAND/FLOOD HUMAN FOOD CHAIN THREAT WASTE CHARACTERISTICS
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 12/14/92

Source: 4 RFI UNIT # 7

Source Hazardous Waste Quantity Value: 230.77

Hazardous Substance	Toxicity Value	Persistence Value	Bio-accum. Value	Toxicity/ Persistence/ Bioaccum. Value
Arsenic	10000	1.00E+00	5.00E+02	5.00E+06
Barium	10000	1.00E+00	5.00E-01	5.00E+03
Cadmium	10000	1.00E+00	5.00E+03	5.00E+07
Chromium	10000	1.00E+00	5.00E+02	5.00E+06
Chromium(VI)	10000	1.00E+00	5.00E+02	5.00E+06
Copper	100	1.00E+00	5.00E+04	5.00E+06
Cyanide	100	4.00E-01	5.00E-01	2.00E+01
Lead	10000	1.00E+00	5.00E+03	5.00E+07
Nickel	10000	1.00E+00	5.00E+02	5.00E+06
Nitric acid	0	4.00E-01	5.00E-01	0.00E+00
Sodium	0	1.00E+00	5.00E-01	0.00E+00
Zinc	10	1.00E+00	5.00E+04	5.00E+05
Zinc phosphide	10000	1.00E+00	5.00E+04	5.00E+08

Source: 6 RFI UNIT # 5

Source Hazardous Waste Quantity Value: 461.54

Hazardous Substance	Toxicity Value	Persistence Value	Bio-accum. Value	Toxicity/ Persistence/ Bioaccum. Value

Hazardous Substances Found in an Observed Release

Sample No.	Observed Release Hazardous Substance	Toxicity Value	Persistence Value	Bio-accum. Value	Toxicity/ Persistence/ Bioaccum. Value

- N/A and/or data not specified

Toxicity/Persistence/Bioaccumulation Value from Source Hazardous Substances:	5.00E+08
Toxicity/Persistence/Bioaccumulation Value from Observed Release Hazardous Substances:	0.00E+00
Toxicity/Persistence/Bioaccumulation Factor:	5.00E+08
Sum of Source Hazardous Waste Quantity Values:	1.50E+04
Hazardous Waste Quantity Factor:	10000
Waste Characteristics Factor Category:	1000

Level I Concentrations

- N/A and/or data not specified

Level II Concentrations

- N/A and/or data not specified

Most Distant Level I Sample

- N/A and/or data not specified

Most Distant Level II Sample

- N/A and/or data not specified

Level I Concentrations

Fishery	Annual Production (pounds)	Human Food Chain Population Value
- N/A and/or data not specified		

Sum of Human Food Chain Population Values: 0.00E+00

Level I Concentrations Factor: 0.00E+00

Level II Concentrations

Fishery	Annual Production (pounds)	Human Food Chain Population Value
- N/A and/or data not specified		

Sum of Human Food Chain Population Values: 0.00E+00

Level II Concentrations Factor: 0.00E+00

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT HUMAN FOOD CHAIN THREAT TARGETS
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 12/14/92

Potential Contamination

Fishery	Annnual Production (pounds)	Type of Surface Water Body	Average Annual Flow (cfs)	Pop. Value (Pi)	Dilution Weight (Di)	Pi*Di
2 SOUTH BOSQUE CREEK	150.0	River	80000	0.3	1.00E-04	3.00E-05
3 LAKE WACO	100000.0	Lake	100050	310.0	1.00E-05	3.10E-03

Sum of (Pi*Di): 3.13E-03

Potential Human Food Chain Contamination Factor: 3.16E-04

Documentation for HARRIS CREEK RIVER Fishery:

According to HRS 4.1.3.3.2.1, human food chain production has been estimated to be greater than zero but less than 2oo pounds per year for Harris Creek and South Bosque River surface water segments of this pathway. Because no precise value for human food chain production was documented, values of 1 pound per year wer assigned to Harris Creek and 150 pounds per year were assigned to South Bosque River surface water segment. The actual value is probally greater than 1 pound and 150 pounds per year.

Reference: 31,32,34

Documentation for SOUTH BOSQUE CREEK Fishery:

Please review Harris Creek description.

Reference: 31,32,34

Documentation for LAKE WACO Fishery:

Please review description for Harris Creek.

Reference: 31,32,34

Food Chain Individual

Location of Nearest Fishery: HARRIS CREEK RIVER
Distance from the Probable Point of Entry: 0.00 miles
Type of Surface Water Body: Mixing Area
Dilution Weight: 0.0010000
Level of Contamination: Potential

Food Chain Individual Factor: 0.00

Documentation for HARRIS CREEK RIVER:

Flow rates were based on visual observation made by EnSafe personnel on 12/1/92 and the Corp of Engineers data for all rivers. Distance from the probale point of entry was measured from topographic maps and visual observations.

Reference: 18,32,

Source: 1 RFI UNIT # 2

Source Hazardous Waste Quantity Value: 14250.00

Hazardous Substance	Eco-toxicity Value	Persistence Value	Bio-accum. Value	Ecotoxicity/ Persistence/ Bioaccum. Value
Chromium	10	1.00E+00	5.00E+02	5.00E+03
Silver	10000	1.00E+00	5.00E+01	5.00E+05

Source: 2 RFI UNIT # 4

Source Hazardous Waste Quantity Value: 0.26

Hazardous Substance	Eco-toxicity Value	Persistence Value	Bio-accum. Value	Ecotoxicity/ Persistence/ Bioaccum. Value
Nitric acid	0	4.00E-01	5.00E-01	0.00E+00
Sodium	0	1.00E+00	5.00E-01	0.00E+00

Source: 3 RFI UNIT # 6

Source Hazardous Waste Quantity Value: 10.59

Hazardous Substance	Eco-toxicity Value	Persistence Value	Bio-accum. Value	Ecotoxicity/ Persistence/ Bioaccum. Value
Aldrin	10000	1.00E+00	5.00E+03	5.00E+07
Chlordane	10000	1.00E+00	5.00E+04	5.00E+08
DDT	10000	1.00E+00	5.00E+04	5.00E+08
Dieldrin	10000	1.00E+00	5.00E+03	5.00E+07
Endrin	10000	1.00E+00	5.00E+03	5.00E+07
Ferrous sulfate	1000	1.00E+00	5.00E-01	5.00E+02
Heptachlor	10000	1.00E+00	5.00E+04	5.00E+08
Hexachlorocyclohexane, delta-	0	1.00E+00	5.00E+02	0.00E+00
Parathion, ethyl-	10000	1.00E+00	5.00E+02	5.00E+06
Toxaphene	10000	1.00E+00	5.00E+04	5.00E+08

Source: 4 RFI UNIT # 7

Source Hazardous Waste Quantity Value: 230.77

Hazardous Substance	Eco-toxicity Value	Persistence Value	Bio-accum. Value	Ecotoxicity/ Persistence/ Bioaccum. Value
Arsenic	100	1.00E+00	5.00E+02	5.00E+04
Barium	1	1.00E+00	5.00E-01	5.00E-01
Cadmium	1000	1.00E+00	5.00E+03	5.00E+06
Chromium	10	1.00E+00	5.00E+02	5.00E+03
Chromium(VI)	100	1.00E+00	5.00E+02	5.00E+04
Copper	1000	1.00E+00	5.00E+04	5.00E+07
Cyanide	1000	4.00E-01	5.00E-01	2.00E+02
Lead	1000	1.00E+00	5.00E+03	5.00E+06
Nickel	1000	1.00E+00	5.00E+02	5.00E+05
Nitric acid	0	4.00E-01	5.00E-01	0.00E+00
Sodium	0	1.00E+00	5.00E-01	0.00E+00
Zinc	100	1.00E+00	5.00E+04	5.00E+06
Zinc phosphide	0	1.00E+00	5.00E+04	0.00E+00

SW PATHWAY: OVERLAND FLOW/FLOOD ENVIRONMENTAL THREAT WASTE CHARACTERISTICS
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 12/14/92

Source: 6 RFI UNIT # 5

Source Hazardous Waste Quantity Value: 461.54

Hazardous Substance	Eco-toxicity Value	Persistence Value	Bio-accum. Value	Ecotoxicity/ Persistence/ Bioaccum. Value

Hazardous Substances Found in an Observed Release

Sample No.	Observed Release Hazardous Substance	Eco-toxicity Value	Persistence Value	Bio-accum. Value	Ecotoxicity/ Persistence/ Bioaccum. Value

- N/A and/or data not specified

Ecotoxicity/Persistence/Bioaccummulation Value from Source Hazardous Substances:	5.00E+08
Ecotoxicity/Persistence/Bioaccummulation Value from Observed Release Hazardous Substances:	0.00E+00
Ecotoxicity/Persistence/Bioaccummulation Factor:	5.00E+08
Sum of Source Hazardous Waste Quantity Values:	1.50E+04
Hazardous Waste Quantity Factor:	10000
Waste Characteristics Factor Category:	1000

Level I Concentrations

- N/A and/or data not specified

Level II Concentrations

- N/A and/or data not specified

Most Distant Level I Sample

- N/A and/or data not specified

Most Distant Level II Sample

- N/A and/or data not specified

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT ENVIRONMENTAL THREAT TARGETS
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 12/14/92

Level I Concentrations

Sensitive Environment	Distance from Probable Point of Entry to Sensitive Env. (miles)	Sensitive Environment Value
- N/A and/or data not specified		

Sum of Sensitive Environments Values: 0

Wetlands

Wetland	Distance from Probable Point of Entry to Wetland (miles)	Wetlands Frontage (miles)
- N/A and/or data not specified		

Total Wetlands Frontage: 0.00 Miles Total Wetlands Value: 0

Sum of Sensitive Environments Value + Wetlands Value: 0.00E+00

Level I Concentrations Factor: 0.00E+00

Level II Concentrations

Sensitive Environment	Distance from Probable Point of Entry to Sensitive Env. (miles)	Sensitive Environment Value
- N/A and/or data not specified		

Sum of Sensitive Environments Values: 0

Wetlands

Wetland	Distance from Probable Point of Entry to Wetland (miles)	Wetlands Frontage (miles)
- N/A and/or data not specified		

Total Wetlands Frontage: 0.00 Miles Total Wetlands Value: 0

Sum of Sensitive Environments Value + Wetlands Value: 0.00E+00

Level II Concentrations Factor: 0.00E+00

Potential Contamination

Sensitive Environments

Type of Surface Water Body	Sensitive Environment		Sensitive Environment Value
Mixing Area	1	POST OAK SAVANNAH	50
Mixing Area	2	BLACKLAND PRAIRIES	50
Mixing Area	3	CROSS-TIMBERS, PRAI	75
Mixing Area	4	ATTWATERS PR. CHICK	50
Mixing Area	5	SOUTHERN BALD EAGLE	100
River	6	MEXICAN DUCK	50
Mixing Area	7	GRAY WOLF	75
Mixing Area	8	RED WOLF	75
Mixing Area	9	BLACK-FOOTED FERRET	75
Mixing Area	10	BLACK-CAPPED VIRIO	100
Mixing Area	11	TEXAS HORNED LIZARD	75

Wetlands

Type of Surface Water Body	Sensitive Environment		Wetlands Frontage	Wetlands Value
Mixing Area	12	W-1	0.25	25
Mixing Area	13	W-2	0.50	25
Mixing Area	14	W-3	1.00	25
Mixing Area	15	W-4	2.00	50
Mixing Area	16	W-5	0.50	25
Mixing Area	17	W-6	0.62	25
Mixing Area	18	W-7	0.43	25
Mixing Area	19	W-8	9.00	250
River	20	W-9	1.23	50
River	21	W-10	8.50	250
Lake	22	W-11	0.50	25
Lake	23	W-12	0.25	25

Documentation for Sensitive Environment POST OAK SAVANNAH:

There were a total of 11 sensitive environmental targets and 13 palustrine wetlands located on the National Wetlands Inventory maps and around the base perimeter. These wetlands were all located within a 15-mile downstream distance from the probable point of entry. The distance from the sensitive environments were noted and values were assigned within the 4-milr radius. It should be noted that the Pre-score program appears to have limitations with the calculations when wetlands are considered from both sides of the surface water body.

Reference: 14,15,16,17,18,28,35

Documentation for Sensitive Environment BLACKLAND PRAIRIES:

Please review Post Oak Savannah.

Reference:

Documentation for Sensitive Environment CROSS-TIMBERS, PRAI:

Please review Post Oak Savannah.

Reference:

Documentation for Sensitive Environment ATTWATERS PR. CHICK:

Please review Post Oak Savannah.

Reference:

Documentation for Sensitive Environment SOUTHERN BALD EAGLE:

Please review Post Oak Savannah.

Reference:

Documentation for Sensitive Environment MEXICAN DUCK:

Please review Post Oak Savannah.

Reference:

Documentation for Sensitive Environment GRAY WOLF:

Please review Post Oak Savannah.

Reference:

Documentation for Sensitive Environment RED WOLF:

Please review Post Oak Savannah.

Reference:

Documentation for Sensitive Environment BLACK-FOOTED FERRET:

Please review Post Oak Savannah.

Reference:

Documentation for Sensitive Environment BLACK-CAPPED VIRIO:

Please review Post Oak Savannah.

Reference:

Documentation for Sensitive Environment TEXAS HORNED LIZARD:

Please review Post Oak Savannah.

Reference:

Documentation for Sensitive Environment W-1:

Please review Post Oak Savannah.

Reference:

Documentation for Sensitive Environment W-2:

Please review Post Oak Savannah.

Reference:

Documentation for Sensitive Environment W-3:

Please review Post Oak Savannah.

Reference:

Documentation for Sensitive Environment W-4:

Please review Post Oak Savannah.

Reference:

Documentation for Sensitive Environment W-5:

Please review Post Oak Savannah.

Reference:

Documentation for Sensitive Environment W-6:

Please review Post Oak Savannah.

Reference:

Documentation for Sensitive Environment W-7:

Please review Post Oak Saannah.

Reference:

Documentation for Sensitive Environment W-8:

Please review Post Oak Savannah.

Reference:

Documentation for Sensitive Environment W-9:

Please review Post Oak Savannah.

Reference:

Documentation for Sensitive Environment W-10:

Please review Post Oak Savannah.

Reference:

Documentation for Sensitive Environment W-11:

Please review Post Oak Savannah.

Reference:

Documentation for Sensitive Environment W-12:

Please review Post Oak Savannah.

Reference:

Documentation for Sensitive Environment W-13:

Please review Post Oak Savannah.

Reference:

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT ENVIRONMENTAL THREAT TARGETS
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 12/14/92

Type of Surface Water Body	Sum of Sens. Environment Values(Sj)	Sum of Wetland Frontage Values(Wj)	Dilution Weight (Dj)	Dj(Wj+Sj)
Large Stream to River	725	350	1.00E-03	1.07E+00
Large River	50	250	1.00E-04	3.00E-02
Very Large River	0	25	1.00E-05	2.50E-04

Sum of Dj(Wj+Sj): 1.11E+00
Sum of Dj(Wj+Sj)/10: 1.11E-01

==========

Potential Contamination Sensitive Environment Factor: 1.11E-01

SOIL EXPOSURE PATHWAY SCORESHEET
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

SOIL EXPOSURE PATHWAY Factor Categories & Factors RESIDENT POPULATION THREAT	Maximum Value	Value Assigned
Likelihood of Exposure		
1. Likelihood of Exposure	550	550
Waste Characteristics		
2. Toxicity	*	1.00E+04
3. Hazardous Waste Quantity	*	10000
4. Waste Characteristics	100	100
Targets		
5. Resident Individual	50	0.00E+00
6. Resident Population		
6a. Level I Concentrations	**	0.00E+00
6b. Level II Concentrations	**	0.00E+00
6c. Resident Population (lines 6a+6b)	**	0.00E+00
7. Workers	15	5.00E+00
8. Resources	5	5.00E+00
9. Terrestrial Sensitive Environments	***	0.00E+00
10. Targets (lines 5+6c+7+8+9)	**	1.00E+01
11. RESIDENT POPULATION THREAT SCORE	**	5.50E+05

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies, see HRS for details.

SOIL EXPOSURE PATHWAY SCORESHEET
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

SOIL EXPOSURE PATHWAY Factor Categories & Factors NEARBY POPULATION THREAT	Maximum Value	Value Assigned
Likelihood of Exposure		
12. Attractiveness/Accessibility	100	5.00E+00
13. Area of Contamination	100	1.00E+02
14. Likelihood of Exposure	500	5.00E+01
Waste Characteristics		
15. Toxicity	*	1.00E+04
16. Hazardous Waste Quantity	*	10000
17. Waste Characteristics	100	100
Targets		
18. Nearby Individual	1	0.00E+00
19. Population Within 1 Mile	**	0.00E+00
20. Targets (lines 18+19)	**	0.00E+00
21. NEARBY POPULATION THREAT SCORE	**	0.00E+00
SOIL EXPOSURE PATHWAY SCORE (Ss)	100	6.67

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT LIKELIHOOD OF EXPOSURE
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

Likelihood of Exposure

No.	Source ID	Level of Contamination
1	RFI UNIT # 2	Level II
2	RFI UNIT # 4	Level II
3	RFI UNIT # 6	Level I
4	RFI UNIT # 7	Level I
6	RFI UNIT # 5	Level I
7	RFI UNIT # 1	Level II

Likelihood of Exposure Factor: 550

Source No.	Hazardous Substance	Depth (ft.)	Concent.	Cancer	RFD	Units
1	Chromium	< 2	0.0E+00	0.0E+00	2.9E+03	ppm
1	Silver	< 2	9.3E+01	0.0E+00	1.7E+03	ppm
2	Chromium	< 2	3.0E+01	0.0E+00	2.9E+03	ppm
2	Lead	< 2	2.5E+01	0.0E+00	0.0E+00	ppm
2	Nickel	< 2	1.8E+02	0.0E+00	1.2E+04	ppm
2	Nitric acid	< 2	0.0E+00	0.0E+00	0.0E+00	ppm
2	Sodium	< 2	0.0E+00	0.0E+00	0.0E+00	ppm
2	Zinc	< 2	2.7E+02	0.0E+00	1.2E+05	ppm
3	Aldrin	< 2	7.0E+02	3.4E-02	1.7E+01	ppm
3	Chlordane	< 2	0.0E+00	4.5E-01	3.5E+01	ppm
3	DDD	< 2	2.0E+03	2.4E+00	0.0E+00	ppm
3	DDE	< 2	1.2E+04	1.7E+00	0.0E+00	ppm
3	DDT	< 2	5.8E+05	1.7E+00	2.9E+02	ppm
3	Dieldrin	< 2	7.0E+02	3.6E-02	2.9E+01	ppm
3	Endosulfan (I or II)	< 2	7.0E+02	0.0E+00	2.9E+01	ppm
3	Endosulfan sulfate	< 2	7.0E+02	0.0E+00	0.0E+00	ppm
3	Endrin	< 2	7.0E+02	0.0E+00	1.7E+02	ppm
3	Ferrous sulfate	< 2	0.0E+00	0.0E+00	0.0E+00	ppm
3	Heptachlor	< 2	7.0E+02	1.3E-01	2.9E+02	ppm
3	Hexachlorocyclohexane, delta-	< 2	0.0E+00	3.2E-01	0.0E+00	ppm
3	Parathion, ethyl-	< 2	0.0E+00	0.0E+00	3.5E+03	ppm
3	Toxaphene	< 2	1.4E+04	5.3E-01	0.0E+00	ppm
4	Arsenic	< 2	2.8E+01	3.3E-01	1.7E+02	ppm
4	Cadmium	< 2	0.0E+00	0.0E+00	2.9E+02	ppm
4	Chromium	< 2	5.2E+03	0.0E+00	2.9E+03	ppm
4	Chromium(VI)	< 2	0.0E+00	0.0E+00	2.9E+03	ppm
4	Lead	< 2	7.8E+01	0.0E+00	0.0E+00	ppm
4	Nickel	< 2	4.6E+01	0.0E+00	1.2E+04	ppm
4	Nitric acid	< 2	0.0E+00	0.0E+00	0.0E+00	ppm
4	Sodium	< 2	0.0E+00	0.0E+00	0.0E+00	ppm
4	Zinc phosphide	< 2	4.4E+03	0.0E+00	1.7E+02	ppm
6	Barium	< 2	2.5E+02	0.0E+00	4.1E+04	ppm
6	Chromium	< 2	3.1E+03	0.0E+00	2.9E+03	ppm

6	Lead	< 2	2.3E+03	0.0E+00	0.0E+00	ppm
6	Toluene	< 2	1.6E-01	0.0E+00	1.2E+05	ppm
6	Trichloroethane, 1,1,2-	< 2	7.6E-01	1.0E+01	2.3E+03	ppm
6	Zinc	< 2	1.8E+03	0.0E+00	1.2E+05	ppm
7	Chlorobenzene	< 2	0.0E+00	0.0E+00	1.2E+04	ppm
7	Toluene	< 2	0.0E+00	0.0E+00	1.2E+05	ppm
7	Trichloroethane, 1,1,1-	< 2	0.0E+00	0.0E+00	5.2E+04	ppm

Documentation for Source RFI UNIT # 2, Contaminants:

This information was obtained from the IAS and the RFI reports. Additional information has been obtained from work which is in progress on the RFI Workplan.

Reference: 15,16 and 42

Documentation for Source RFI UNIT # 4, Contaminants:

Various samples have been taken for the RFI workplan and these samples analyses are listed in the HRS II documentation package. The highest number listed from all the sample analysis was used as numerical documentation for this sample area in RFI unit # 4.

Reference: 5,14,15,16,42

Documentation for Source RFI UNIT # 6, Contaminants:

The results indicated that the primary pesticide is DDT, however other pesticides were also found to be present. Toxaphene, benzene-hexachloride (BHC), aldrin, dieldrin, endrin, heptachlor and daughter compounds of DDT.

These results were obtained from a sample collected by Hercules at the footing construction east of building 704. It will be assumed that this contamination is the result of migration of contamination associated with RFI unit #6.

Reference: 15,16,11

Documentation for Source RFI UNIT # 7, Contaminants:

These contaimnants have been established as being disposed of in this area. There are a listing of the contaminants and the analytical values in reference 42. The vaules chosen in the chart are the values which were the highest values for each of the constituents presented.

Reference: 42

Documentation for Source RFI UNIT # 5, Contaminants:

The samples collected from the evaporation ponds which make up RFI unit # 5, have been listed in reference number 42. This information states that the majority of the analyzed constituents were metals, which were collected within 0 - 6" of the ground surface.

Reference: 42

Documentation for Source RFI UNIT # 1, Contaminants:

Although the exact materials disposed of and the quanities are unknown, the materials reportedly burned in this area include: Toluene, 1,1,1 Trichloroethane, Chlorinated benzenes, Ammonium perchlorate, ammonium nitrate based explosives and various solvents used for clean-up operations during manufacturing of explosives.

Reference: 14,15,16

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT WASTE CHARACTERISTICS
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

Source: 1 RFI UNIT # 2

Source Hazardous Waste Quantity Value: 187500.00

Hazardous Substance	Toxicity Value
Chromium	10000
Silver	1000

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT WASTE CHARACTERISTICS
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

Source: 2 RFI UNIT # 4

Source Hazardous Waste Quantity Value: 0.26

Hazardous Substance	Toxicity Value
Chromium	10000
Lead	10000
Nickel	10000
Nitric acid	0
Sodium	0
Zinc	10

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT WASTE CHARACTERISTICS
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

Source: 3 RFI UNIT # 6

Source Hazardous Waste Quantity Value: 28.18

Hazardous Substance	Toxicity Value
Aldrin	10000
Chlordane	10000
DDD	100
DDE	100
DDT	1000
Dieldrin	10000
Endosulfan (I or II)	10000
Endosulfan sulfate	0
Endrin	10000
Ferrous sulfate	10
Heptachlor	1000
Hexachlorocyclohexane, delta-	1000
Parathion, ethyl-	100
Toxaphene	1000

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT WASTE CHARACTERISTICS
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

Source: 4 RFI UNIT # 7

Source Hazardous Waste Quantity Value: 0.00

Hazardous Substance	Toxicity Value
Arsenic	10000
Cadmium	10000
Chromium	10000
Chromium(VI)	10000
Lead	10000
Nickel	10000
Nitric acid	0
Sodium	0
Zinc phosphide	10000

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT WASTE CHARACTERISTICS
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

Source: 6 RFI UNIT # 5

Source Hazardous Waste Quantity Value: 461.54

Hazardous Substance	Toxicity Value
Barium	10000
Chromium	10000
Lead	10000
Toluene	10
Trichloroethane, 1,1,2-	1000
Zinc	10

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT WASTE CHARACTERISTICS
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

Source: 7 RFI UNIT # 1

Source Hazardous Waste Quantity Value: 531.69

Hazardous Substance	Toxicity Value
Chlorobenzene	100
Toluene	10
Trichloroethane, 1,1,1-	10

Toxicity Factor:	1.00E+04
Sum of Source Hazardous Waste Quantity Values:	1.89E+05
Hazardous Waste Quantity Factor:	10000
Waste Characteristics Factor Category:	100

Targets

Level I Population:	0.0	Value:	0.00
Level II Population:	0.0	Value:	0.00
Workers:	2.0	Value:	5.00

Documentation for Workers:

Some facility employees were noted working in or around the drainage ditches. Although this is not a permanent position for these workers, they have occassion to be in or around the ditched areas.

Reference: 14, 15

Resident Individual:	Potentia	Value:	0.00
Resources:	YES	Value:	5.00

Documentation for Resources:

There is agriculture and livestock grazing in the area of potential contamination.

Reference: 14, 15

Terrestial Sensitive Environment	Value
- N/A and/or data not specified	

Terrestrial Sensitive Environments Factor: 0.00

NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT LIKELIHOOD OF EXPOSURE
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

Likelihood of Exposure

No.	Source ID	Level of Contamination	Attractiveness/ Accessibility	Area of Contam. (sq. feet)
1	RFI UNIT # 2	Level II	5	2250
2	RFI UNIT # 4	Level II	5	300
3	RFI UNIT # 6	Level I	5	958000
4	RFI UNIT # 7	Level I	5	3000
6	RFI UNIT # 5	Level I	5	6000

Highest Attractiveness/Accessibility Value: 5
Sum of Eligible Areas Of Contamination (sq. feet): 969550
Area of Contamination Value: 100

Likelihood of Exposure Factor Category: 50

Documentation for Attractiveness/Accessibility, Source RFI UNIT # 2:

The drainage ditches were noted in the field and on topographic maps to be approximately 1.5 feet across and from 850 - 1,000 feet in length, on average. Sediment samples have not been analyzed. T herefore, the area is assumed to be contaminated by the facts presented in the RFI and visual inspection by EnSafe/Allen and Hoshall personnel and Hercules representatives. The culminative of the total area of all ditches which received contamination is speculative.

Reference: 8,16,18,35

Documentation for Attractiveness/Accessibility, Source RFI UNIT # 4:

See documentation on RFI unit # 2

Reference: 8,16,18,35

Documentation for Attractiveness/Accessibility, Source RFI UNIT # 6:

This site is not accessible to the general public but workers are exposed to the area.

Reference: 8,16,18,35

Documentation for Attractiveness/Accessibility, Source RFI UNIT # 7:

See documentation on RFI Unit # 2

Reference: 8,16,18,35

Documentation for Attractiveness/Accessibility, Source RFI UNIT # 8:

Fuel oil is stocked in an above ground 25,000 gallon tank located east of building F-603. While digging a trench besides building F-603, Hercules representatives reported the discovery of a concrete tank saddle and a significant amount of diesel contamination in the sub-surface soils in the front of the southwest corner of the existing sulfuric acid tank.

Reference: 14,15,16

Documentation for Attractiveness/Accessibility, Source RFI UNIT # 5:

This site is not accessible the the general public or the workers because it is surrounded by a fence which restricts access.

Reference: 14,15,16

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT LIKELIHOOD OF EXPOSURE
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

Documentation for Attractiveness/Accessibility, Source RFI UNIT # 1:

The area of contamination is reported to be enclosed by a four-tier barbed wire fence which excludes transient visitors and others including workers when area is set to burn.

Reference: 14,15,16

Source No.	Hazardous Substance	Depth (ft.)	Concent.	Cancer	RFD	Units
1	Chromium	< 2	0.0E+00	0.0E+00	2.9E+03	ppm
1	Silver	< 2	9.3E+01	0.0E+00	1.7E+03	ppm
2	Chromium	< 2	3.0E+01	0.0E+00	2.9E+03	ppm
2	Lead	< 2	2.5E+01	0.0E+00	0.0E+00	ppm
2	Nickel	< 2	1.8E+02	0.0E+00	1.2E+04	ppm
2	Nitric acid	< 2	0.0E+00	0.0E+00	0.0E+00	ppm
2	Sodium	< 2	0.0E+00	0.0E+00	0.0E+00	ppm
2	Zinc	< 2	2.7E+02	0.0E+00	1.2E+05	ppm
3	Aldrin	< 2	7.0E+02	3.4E-02	1.7E+01	ppm
3	Chlordane	< 2	0.0E+00	4.5E-01	3.5E+01	ppm
3	DDD	< 2	2.0E+03	2.4E+00	0.0E+00	ppm
3	DDE	< 2	1.2E+04	1.7E+00	0.0E+00	ppm
3	DDT	< 2	5.8E+05	1.7E+00	2.9E+02	ppm
3	Dieldrin	< 2	7.0E+02	3.6E-02	2.9E+01	ppm
3	Endosulfan (I or II)	< 2	7.0E+02	0.0E+00	2.9E+01	ppm
3	Endosulfan sulfate	< 2	7.0E+02	0.0E+00	0.0E+00	ppm
3	Endrin	< 2	7.0E+02	0.0E+00	1.7E+02	ppm
3	Ferrous sulfate	< 2	0.0E+00	0.0E+00	0.0E+00	ppm
3	Heptachlor	< 2	7.0E+02	1.3E-01	2.9E+02	ppm
3	Hexachlorocyclohexane, delta-	< 2	0.0E+00	3.2E-01	0.0E+00	ppm
3	Parathion, ethyl-	< 2	0.0E+00	0.0E+00	3.5E+03	ppm
3	Toxaphene	< 2	1.4E+04	5.3E-01	0.0E+00	ppm
4	Arsenic	< 2	2.8E+01	3.3E-01	1.7E+02	ppm
4	Cadmium	< 2	0.0E+00	0.0E+00	2.9E+02	ppm
4	Chromium	< 2	5.2E+03	0.0E+00	2.9E+03	ppm
4	Chromium(VI)	< 2	0.0E+00	0.0E+00	2.9E+03	ppm
4	Lead	< 2	7.8E+01	0.0E+00	0.0E+00	ppm
4	Nickel	< 2	4.6E+01	0.0E+00	1.2E+04	ppm
4	Nitric acid	< 2	0.0E+00	0.0E+00	0.0E+00	ppm
4	Sodium	< 2	0.0E+00	0.0E+00	0.0E+00	ppm
4	Zinc phosphide	< 2	4.4E+03	0.0E+00	1.7E+02	ppm
6	Barium	< 2	2.5E+02	0.0E+00	4.1E+04	ppm
6	Chromium	< 2	3.1E+03	0.0E+00	2.9E+03	ppm
6	Lead	< 2	2.3E+03	0.0E+00	0.0E+00	ppm
6	Toluene	< 2	1.6E-01	0.0E+00	1.2E+05	ppm
6	Trichloroethane, 1,1,2-	< 2	7.6E-01	1.0E+01	2.3E+03	ppm
6	Zinc	< 2	1.8E+03	0.0E+00	1.2E+05	ppm

Documentation for Source RFI UNIT # 2, Contaminants:

This information was obtained from the IAS and the RFI reports. Additional information has been obtained from work which is in progress on the RFI Workplan.

Reference: 15,16 and 42

Documentation for Source RFI UNIT # 4, Contaminants:

Various samples have been taken for the RFI workplan and these samples analyses are listed in the HRS II documentation package. The highest number listed from all the sample analysis was used as numerical documentation for this sample area in RFI unit # 4.

Reference: 5,14,15,16,42

Documentation for Source RFI UNIT # 6, Contaminants:

The results indicated that the primary pesticide is DDT, however other pesticides were also found to be present. Toxaphene, benzene-hexachloride (BHC), aldrin, dieldrin, endrin, heptachlor and daughter compounds of DDT.

These results were obtained from a sample collected by Hercules at the footing construction east of building 704. It will be assumed that this contamination is the result of migration of contamination associated with RFI unit #6.

Reference: 15,16,11

Documentation for Source RFI UNIT # 7, Contaminants:

These contaimnants have been established as being disposed of in this area. There are a listing of the contaminants and the analytical values in reference 42. The vaules chosen in the chart are the values which were the highest values for each of the constituents presented.

Reference: 42

Documentation for Source RFI UNIT # 5, Contaminants:

The samples collected from the evaporation ponds which make up RFI unit # 5, have been listed in reference number 42. This information states that the majority of the analyzed constituents were metals, which were collected within 0 - 6" of the ground surface.

Reference: 42

Documentation for Source RFI UNIT # 1, Contaminants:

Although the exact materials disposed of and the quanities are unknown, the materials reportedly burned in this area include: Toluene, 1,1,1 Trichloroethane, Chlorinated benzenes, Ammonium perchlorate, ammonium nitrate based explosives and various solvents used for clean-up operations during manufacturing of explosives.

Reference: 14,15,16

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT WASTE CHARACTERISTICS
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

Source: 1 RFI UNIT # 2

Source Hazardous Waste Quantity Value: 187500.00

Hazardous Substance	Toxicity Value
Chromium	10000
Silver	1000

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT WASTE CHARACTERISTICS
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

Source: 2 RFI UNIT # 4

Source Hazardous Waste Quantity Value: 0.26

Hazardous Substance	Toxicity Value
Chromium	10000
Lead	10000
Nickel	10000
Nitric acid	0
Sodium	0
Zinc	10

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT WASTE CHARACTERISTICS
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

Source: 3 RFI UNIT # 6

Source Hazardous Waste Quantity Value: 28.18

Hazardous Substance	Toxicity Value
Aldrin	10000
Chlordane	10000
DDD	100
DDE	100
DDT	1000
Dieldrin	10000
Endosulfan (I or II)	10000
Endosulfan sulfate	0
Endrin	10000
Ferrous sulfate	10
Heptachlor	1000
Hexachlorocyclohexane, delta-	1000
Parathion, ethyl-	100
Toxaphene	1000

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT WASTE CHARACTERISTICS
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

Source: 4 RFI UNIT # 7

Source Hazardous Waste Quantity Value: 0.00

Hazardous Substance	Toxicity Value
Arsenic	10000
Cadmium	10000
Chromium	10000
Chromium(VI)	10000
Lead	10000
Nickel	10000
Nitric acid	0
Sodium	0
Zinc phosphide	10000

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT WASTE CHARACTERISTICS
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

Source: 6 RFI UNIT # 5

Source Hazardous Waste Quantity Value: 461.54

Hazardous Substance	Toxicity Value
Barium	10000
Chromium	10000
Lead	10000
Toluene	10
Trichloroethane, 1,1,2-	1000
Zinc	10

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT WASTE CHARACTERISTICS
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

Source: 7 RFI UNIT # 1

Source Hazardous Waste Quantity Value: 531.69

Hazardous Substance	Toxicity Value
Chlorobenzene	100
Toluene	10
Trichloroethane, 1,1,1-	10

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT WASTE CHARACTERISTICS
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

Toxicity Factor:	1.00E+04
Sum of Source Hazardous Waste Quantity Values:	1.88E+05
Hazardous Waste Quantity Factor:	10000
Waste Characteristics Factor Category:	100

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT TARGETS
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

Nearby Individual

Population within 1/4 mile: 0.0

Nearby Individual Value: 0.0

Population Within 1 Mile

Travel Distance Category	Number of People	Value
> 0 to 1/4 mile	0.0	0.0
> 1/4 to 1/2 mile	0.0	0.0
> 1/2 to 1 mile	0.0	0.0
Population Within 1 Mile Factor:		0.0

Documentation for Population > 0 to 1/4 mile Distance Category:

650 persons work on base but the base is enclosed by a fence and is not accessible to the general public, the outlying population is not considered.

Reference: 36

AIR PATHWAY SCORESHEET
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

AIR MIGRATION PATHWAY Factor Categories & Factors	Maximum Value	Value Assigned
Likelihood of Release		
1. Observed Release	550	0
2. Potential to Release		
2a. Gas Potential to Release	500	360
2b. Particulate Potential to Release	500	330
2c. Potential to Release	500	360
3. Likelihood of Release	550	360
Waste Characteristics		
4. Toxicity/Mobility	*	1.00E+03
5. Hazardous Waste Quantity	*	10000
6. Waste Characteristics	100	56
Targets		
7. Nearest Individual	50	2.00E+01
8. Population		
8a. Level I Concentrations	**	0.00E+00
8b. Level II Concentrations	**	0.00E+00
8c. Potential Contamination	**	1.05E+02
8d. Population (lines 8a+8b+8c)	**	1.05E+02
9. Resources	5	5.00E+00
10. Sensitive Environments		
10a. Actual Contamination	***	0.00E+00
10b. Potential Contamination	***	2.68E-02
10c. Sens. Environments(lines 10a+10b)	***	2.68E-02
11. Targets (lines 7+8d+9+10c)	**	1.30E+02
AIR MIGRATION PATHWAY SCORE (Sa)	100	3.18E+01

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies, see HRS for details.

OBSERVED RELEASE

No.	Sample ID	Distance (miles)	Level of Contamination

- N/A and/or data not specified

Observed Release Factor: 0

Documentation for Sample :

There has not been an observed release established for the air pathway.

Reference:

Gas Migration Potential

GAS POTENTIAL TO RELEASE

Source ID	Source Type	Gas Contain. Value (A)	Gas Source Type Value (B)	Gas Migrtn. Potent. Value (C)	Sum (B+C)	Gas Potential to Rel. Value A(B+C)
RFI UNIT # 6	Contaminated Soil	10	19	11	30	300
RFI UNIT # 5	Surface Impoundment	10	19	17	36	360
RFI UNIT # 1	Contaminated Soil	10	0	17	17	170

Gas Potential to Release Factor: 360

Documentation for Gas Containment, Source RFI UNIT # 2:

Because some of the contaminants were disposed of in the drainage ditch, and some of the constitutients may have the ability to volitize, this air factor was given for the evaluation.

Reference: 1,14,15,16

Documentation for Source Type, Source RFI UNIT # 2:

IN THE EARLY 1960'S ROCKETDYNE BEGAN OPERATING THE NONDISTRUCTIVE TESTING EQUIPMENT. THEY BEGAN DISCHARGING APPROXIMATELY 1500-GALLONS/DAY, 5-DAYS/WEEK, OF EFFLUENT INTO THE DITCH. THE REVIEW OF RECORDS HAVE INDICATED THAT A SILVER RECOVERY UNIT WAS NOT USED UNTIL 1979.

Reference: 3, 5, 16

Documentation for Gas Containment, Source RFI UNIT # 4:

There are no materials which would yield voc's, therefore no gas value was given.

Reference: 14,15,16

Documentation for Source Type, Source RFI UNIT # 4:

ACID ETCHING OF STEEL MOTOR CASE WAS OCCASIONALLY PERFORMED IN THE AREA DURING THE 1970'S. THIS ACTIVITY WAS CONDUCTED EVERY OTHER YEAR AND REPORTEDLY GENERATED FROM 15 TO 20 GALLONS OF ACIDS BEARING WASTE WHICH WAS DUMPED OUT ON THE GRROUND BEHIND BUILDING R-1601.

Reference: 14, 15, 16

Documentation for Gas Containment, Source RFI UNIT # 6:

The gas containment factor value is considered to be 10 because the contamination has been detected at or near the ground surface.

Reference: 1,14,15,16,42

Documentation for Source Type, Source RFI UNIT # 6:

THE PESTICIDE DUMP IS LOCATED IN AREA G AND IS DESCRIBED AS AN AREA 60 FEET WIDE BY 600 FEET LONG BETWEEN THE PERIMETER ROAD AND THE BOUNDARY FENCE. THE CHEMICAL USED IN AREA G OPERATED BY CIBA-GEIGY COMPANY. OPERATION INCLUDED THE FORMULATION OF DDT, TOXAPHENE, PAPRTHION, SULFUR, ALDRIN-DIELDRIN, CHLORADANE-HEPTACHLOR, BHC-LINDANE, AND ENDRIN. However, there has been additional information which states that surface contamination around Building 704 and 705 is substantial. ERM-Southwest,Inc., states in its Draft RFI Report, that at the interval of 0-1 foot, there are large areas which contain pesticide contamination. These areas added to the existing 60 x 600 foot dump area make the surface area contaminated

by pesticides approximately 958,000 square feet.

Reference: 5,8,9,10,11,14,15,16, and 43

Documentation for Gas Containment, Source RFI UNIT # 7:

The acid that was discharged to this site will have a gas containment value of three.

Reference: 1,14,15,16,

Documentation for Source Type, Source RFI UNIT # 7:

SPENT PLATING AND TREATMENT SOLUTIONS WERE DISCHARGED TO A TREATMENT TANK LOCATED BEHIND BUILDING M-1206. WASTEWATER FROM PROCESS RINSE TANKS IN BUILDING M-1206 WAS DISCHARGED DIRECTLY TO A DRAINAGE DITCH WHICH RUNS BEHIND THE TREATMENT TANK IN A NORTHERLY DIRECTION EMPTYING INTO A STOCK POND. OCCASSIONALLY, UNSPECIFIED QUANITIES OF WASTEWATER PRODUCED BY A STEEL PASSIVATION PROCESS UTILIZING NITRIC ACID AND SODIUM DICHROMATE WERE DISCHARGED WITHOUT TREATMENT TO THE DRAINAGE DITCH.

Reference: 14, 15, 16

Documentation for Gas Containment, Source RFI UNIT # 8:

This value was obtained because the site is more the 5-feet under g round. HRS states the cutoff in depth is 3-feet for values of from 3 to 10. This site score is therefore zero.

Reference: 1,14,15,16

Documentation for Source Type, Source RFI UNIT # 8:

FUEL OIL IS STOCKED IN AN ABOVE-GROUND 25,000 GALLON TANK LOCATED EAST OF BUILDING F-603. WHILE DIGGING A TRENCH BESIDES BUILDING F-603, HERCULES REPRESENTATIVES REPORTED THE DISCOVERY OF A CONCRETE TANK SADDLE AND A SIGNIFICANT AMOUNT OF DIESEL CONTAMINATION IN THE SUB-SURFACE SOILS IN THE FRONT OF THE SOUTHWEST CORNER OF THE EXISTING SULFURIC ACID TANK.

Reference: 14, 15, 16

Documentation for Gas Containment, Source RFI UNIT # 5:

There may be possible gas contamination from this sourse but the exact constituents discharged are unknown.

Reference: 14,15,16

Documentation for Source Type, Source RFI UNIT # 5:

LIMITED QUANITIES OF WASTEWATER WERE GENERATED FROM PROPELLANT PROCESSING ACTIVITIES LOCATED IN THE BUILDINGS M-1217 AND M-1227. THE WASTEWATER WAS DISCHARGED INTO SMALL EVAPORATION PONDS LOCATED BETWEEN THE BUILDINGS. NORMALLY, THESE PONDS DID NOT DISCHARGE, BUT OVERFLOW FROM THE PONDS WAS PIPED TO A DRAINAGE DITCH WHICH FLOWS TO THE SOUTH AND EVENTUALLY ENDS UP IN A TRIBUTARY TO STATION CREEK.

Reference: 14, 15, 16

Documentation for Source Type, Source RFI UNIT # 1:

The area is located in the southeast corner of the site. It is described as a 4,800-foot diameter circle (approximately 415 acres) with a four strand barbed wire fence arround the perimeter. The burn opperations take place in the center of a clay lined, bermed area that will reportedly contain a 100-year rainfall event without

surface runoff. The berms are designed to prevent horizontal migration of burn residue. Conversely, the clay liner is designed to prevent vertical migration of contaminants downward into the underlying soils and groundwater. This calculates to approximately 18,077,400.00 square feet in contaminated bermed area.

Reference: 1,14,15,16

Source: RFI UNIT # 2

Gaseous Hazardous Substance	Hazardous Substance Gas Migration Potential Value

Average of Gas Migration Potential Value for 3 Hazardous Substances: 0.000

Gas Migration Potential Value From Table 6-7: 0

Source: RFI UNIT # 4

Gaseous Hazardous Substance	Hazardous Substance Gas Migration Potential Value

Average of Gas Migration Potential Value for 3 Hazardous Substances: 0.000

Gas Migration Potential Value From Table 6-7: 0

AIR PATHWAY LIKELIHOOD OF RELEASE
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

Source: RFI UNIT # 6

Gaseous Hazardous Substance	Hazardous Substance Gas Migration Potential Value
Aldrin	11
Chlordane	6
DDD	6
DDE	6
DDT	6
Dieldrin	6
Endosulfan (I or II)	11
Endosulfan sulfate	17
Endrin	6
Heptachlor	11
Hexachlorocyclohexane, delta-	6
Parathion, ethyl-	6
Toxaphene	6

Average of Gas Migration Potential Value for 3 Hazardous Substances: 13.000

Gas Migration Potential Value From Table 6-7: 11

Source: RFI UNIT # 7

Gaseous Hazardous Substance	Hazardous Substance Gas Migration Potential Value

Average of Gas Migration Potential Value for 3 Hazardous Substances: 0.000

Gas Migration Potential Value From Table 6-7: 0

AIR PATHWAY LIKELIHOOD OF RELEASE
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

Source: RFI UNIT # 8

Gaseous Hazardous Substance	Hazardous Substance Gas Migration Potential Value

Average of Gas Migration Potential Value for 3 Hazardous Substances: 0.000

Gas Migration Potential Value From Table 6-7: 0

Source: RFI UNIT # 5

Gaseous Hazardous Substance	Hazardous Substance Gas Migration Potential Value
Toluene	17
Trichloroethane, 1,1,2-	17

Average of Gas Migration Potential Value for 3 Hazardous Substances: 17.000

Gas Migration Potential Value From Table 6-7: 17

AIR PATHWAY LIKELIHOOD OF RELEASE
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

Source: RFI UNIT # 1

Gaseous Hazardous Substance	Hazardous Substance Gas Migration Potential Value
Chlorobenzene	17
Toluene	17
Trichloroethane, 1,1,1-	17

Average of Gas Migration Potential Value for 3 Hazardous Substances: 17.000

Gas Migration Potential Value From Table 6-7: 17

AIR PATHWAY LIKELIHOOD OF RELEASE
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

Particulate Migration Potential

PARTICULATE POTENTIAL TO RELEASE

Source ID	Source Type	Partic. Contain. Value (A)	Partic. Source Type Value (B)	Partic. Migrtn. Potent. Value (C)	Sum (B+C)	Partic. Potential to Rel. Value A(B+C)
RFI UNIT # 6	Contaminated Soil	10	22	11	33	330

Particulate Potential to Release Factor: 330

Documentation for Particulate Containment, Source RFI UNIT # 2:

There was no burning of materials, therefore no factor value was given.

Reference: 14,1,15,16

Documentation for Source Type, Source RFI UNIT # 2:

IN THE EARLY 1960'S ROCKETDYNE BEGAN OPERATING THE NONDISTRUCTIVE TESTING EQUIPMENT. THEY BEGAN DISCHARGING APPROXIMATELY 1500-GALLONS/DAY, 5-DAYS/WEEK, OF EFFLUENT INTO THE DITCH. THE REVIEW OF RECORDS HAVE INDICATED THAT A SILVER RECOVERY UNIT WAS NOT USED UNTIL 1979.

Reference: 3, 5, 16

Documentation for Particulate Containment, Source RFI UNIT # 4:

Nothing was burned in this area, therefore no particulate value was given.

Reference: 14,15,16

Documentation for Source Type, Source RFI UNIT # 4:

ACID ETCHING OF STEEL MOTOR CASE WAS OCCASIONALLY PERFORMED IN THE AREA DURING THE 1970'S. THIS ACTIVITY WAS CONDUCTED EVERY OTHER YEAR AND REPORTEDLY GENERATED FROM 15 TO 20 GALLONS OF ACIDS BEARING WASTE WHICH WAS DUMPED OUT ON THE GRROUND BEHIND BUILDING R-1601.

Reference: 14, 15, 16

Documentation for Particulate Containment, Source RFI UNIT # 6:

The particulate value is considered to be 10, because the contamination has been detected at or near the ground surface.

Reference: 1,16,42

Documentation for Source Type, Source RFI UNIT # 6:

THE PESTICIDE DUMP IS LOCATED IN AREA G AND IS DESCRIBED AS AN AREA 60 FEET WIDE BY 600 FEET LONG BETWEEN THE PERIMETER ROAD AND THE BOUNDARY FENCE. THE CHEMICAL USED IN AREA G OPERATED BY CIBA-GEIGY COMPANY. OPERATION INCLUDED THE FORMULATION OF DDT, TOXAPHENE, PAPRTHION, SULFUR, ALDRIN-DIELDRIN, CHLORADANE-HEPTACHLOR, BHC-LINDANE, AND ENDRIN. However, there has been additional information which states that surface contamination around Building 704 and 705 is substantial. ERM-Southwest,Inc., states in its Draft RFI Report, that at the interval of 0-1 foot, there are large areas which contain pesticide contamination. These areas added to the existing 60 x 600 foot dump area make the surface area contaminated

by pesticides approximately 958,000 square feet.

Reference: 5,8,9,10,11,14,15,16, and 43

Documentation for Particulate Containment, Source RFI UNIT # 7:

There was no burning here to produce a particulate value.

Reference: 1,14,15,16,

Documentation for Source Type, Source RFI UNIT # 7:

SPENT PLATING AND TREATMENT SOLUTIONS WERE DISCHARGED TO A TREATMENT TANK LOCATED BEHIND BUILDING M-1206. WASTEWATER FROM PROCESS RINSE TANKS IN BUILDING M-1206 WAS DISCHARGED DIRECTLY TO A DRAINAGE DITCH WHICH RUNS BEHIND THE TREATMENT TANK IN A NORTHERLY DIRECTION EMPTYING INTO A STOCK POND. OCCASSIONALLY, UNSPECIFIED QUANITIES OF WASTEWATER PRODUCED BY A STEEL PASSIVATION PROCESS UTILIZING NITRIC ACID AND SODIUM DICHROMATE WERE DISCHARGED WITHOUT TREATMENT TO THE DRAINAGE DITCH.

Reference: 14, 15, 16

Documentation for Particulate Containment, Source RFI UNIT # 8:

There was no burning at this site, therefore the containment value is zero.

Reference: 1,14,15,16,

Documentation for Source Type, Source RFI UNIT # 8:

FUEL OIL IS STOCKED IN AN ABOVE-GROUND 25,000 GALLON TANK LOCATED EAST OF BUILDING F-603. WHILE DIGGING A TRENCH BESIDES BUILDING F-603, HERCULES REPRESENTATIVES REPORTED THE DISCOVERY OF A CONCRETE TANK SADDLE AND A SIGNIFICANT AMOUNT OF DIESEL CONTAMINATION IN THE SUB-SURFACE SOILS IN THE FRONT OF THE SOUTHWEST CORNER OF THE EXISTING SULFURIC ACID TANK.

Reference: 14, 15, 16

Documentation for Particulate Containment, Source RFI UNIT # 5:

There was no burning at this site therefore the value is zero

Reference: 1,14,15,16

Documentation for Source Type, Source RFI UNIT # 5:

LIMITED QUANITIES OF WASTEWATER WERE GENERATED FROM PROPELLANT PROCESSING ACTIVITIES LOCATED IN THE BUILDINGS M-1217 AND M-1227. THE WASTEWATER WAS DISCHARGED INTO SMALL EVAPORATION PONDS LOCATED BETWEEN THE BUILDINGS. NORMALLY, THESE PONDS DID NOT DISCHARGE, BUT OVERFLOW FROM THE PONDS WAS PIPED TO A DRAINAGE DITCH WHICH FLOWS TO THE SOUTH AND EVENTUALLY ENDS UP IN A TRIBUTARY TO STATION CREEK.

Reference: 14, 15, 16

Documentation for Source Type, Source RFI UNIT # 1:

The area is located in the southeast corner of the site. It is described as a 4,800-foot diameter circle (approximately 415 acres) with a four strand barbed wire fence arround the perimeter. The burn opperations take place in the center of a clay lined, bermed area that will reportedly contain a 100-year rainfall event without surface runoff. The berms are designed to prevent horizontal

migration of burn residue. Conversely, the clay liner is designed to prevent vertical migration of contaminants downward into the underlying soils and groundwater. This calculates to approximately 18,077,400.00 square feet in contaminated bermed area.

Reference: 1,14,15,16

Documentation for Particulate Migration Potential:

This number was obtained from the Figure 6-2 of Reference 1 on page 51654. This figure is based on the site location, from which a value is assigned for particulate migration potential.

Reference: 1, Figure 6-2

Source: RFI UNIT # 2

Particulate Hazardous Substance
Chromium
Silver

Source: RFI UNIT # 4

Particulate Hazardous Substance
Chromium
Lead
Nickel
Nitric acid
Sodium
Zinc

Source: RFI UNIT # 6

Particulate Hazardous Substance
Aldrin
Chlordane
DDD
DDE
DDT
Dieldrin
Endosulfan (I or II)
Endrin
Ferrous sulfate
Heptachlor
Hexachlorocyclohexane, delta-
Parathion, ethyl-
Toxaphene

Source: RFI UNIT # 7

Particulate Hazardous Substance
Arsenic
Barium
Cadmium
Chromium
Chromium(VI)
Copper
Cyanide
Lead
Nickel
Nitric acid
Sodium
Zinc
Zinc phosphide

Source: RFI UNIT # 8

Particulate Hazardous Substance

Source: RFI UNIT # 5

Particulate Hazardous Substance
Barium
Chromium
Lead
Zinc

Source: RFI UNIT # 1

Particulate Hazardous Substance

Source: 1 RFI UNIT # 2

Source Hazardous Waste Quantity Value: 187500.00

Hazardous Substance	Toxicity Value	Gas Mobility Value	Particulate Mobility Value	Toxicity/ Mobility Value
Chromium	10000	NA	NA	0.00E+00
Silver	1000	NA	NA	0.00E+00

Source: 3 RFI UNIT # 6

Source Hazardous Waste Quantity Value: 28.18

Hazardous Substance	Toxicity Value	Gas Mobility Value	Particulate Mobility Value	Toxicity/ Mobility Value
Aldrin	10000	2.00E-02	8.00E-04	2.00E+02
Chlordane	10000	2.00E-03	8.00E-04	2.00E+01
DDD	100	2.00E-03	8.00E-04	2.00E-01
DDE	100	2.00E-03	8.00E-04	2.00E-01
DDT	1000	2.00E-03	8.00E-04	2.00E+00
Dieldrin	10000	2.00E-03	8.00E-04	2.00E+01
Endosulfan (I or II)	10000	2.00E-03	8.00E-04	2.00E+01
Endosulfan sulfate	100	1.00E+00	NA	1.00E+02
Endrin	10000	2.00E-03	8.00E-04	2.00E+01
Ferrous sulfate	10	NA	8.00E-04	8.00E-03
Heptachlor	1000	2.00E-02	8.00E-04	2.00E+01
Hexachlorocyclohexane, delta-	1000	2.00E-02	8.00E-04	2.00E+01
Parathion, ethyl-	100	2.00E-03	8.00E-04	2.00E-01
Toxaphene	1000	2.00E-03	8.00E-04	2.00E+00

AIR PATHWAY WASTE CHARACTERISTICS
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT - 02/01/93

Source: 4 RFI UNIT # 7

Source Hazardous Waste Quantity Value: 230.77

Hazardous Substance	Toxicity Value	Gas Mobility Value	Particulate Mobility Value	Toxicity/ Mobility Value
Arsenic	10000	NA	NA	0.00E+00
Barium	10000	NA	NA	0.00E+00
Cadmium	10000	NA	NA	0.00E+00
Chromium	10000	NA	NA	0.00E+00
Chromium(VI)	10000	NA	NA	0.00E+00
Copper	100	NA	NA	0.00E+00
Cyanide	100	NA	NA	0.00E+00
Lead	10000	NA	NA	0.00E+00
Nickel	10000	NA	NA	0.00E+00
Nitric acid	100	NA	NA	0.00E+00
Sodium	100	NA	NA	0.00E+00
Zinc	10	NA	NA	0.00E+00
Zinc phosphide	10000	NA	NA	0.00E+00

Source: 6 RFI UNIT # 5

Source Hazardous Waste Quantity Value: 461.54

Hazardous Substance	Toxicity Value	Gas Mobility Value	Particulate Mobility Value	Toxicity/ Mobility Value
Barium	10000	NA	NA	0.00E+00
Chromium	10000	NA	NA	0.00E+00
Lead	10000	NA	NA	0.00E+00
Toluene	10	1.00E+00	NA	1.00E+01
Trichloroethane, 1,1,2-	1000	1.00E+00	NA	1.00E+03
Zinc	10	NA	NA	0.00E+00

Source: 7 RFI UNIT # 1

Source Hazardous Waste Quantity Value: 0.00

Hazardous Substance	Toxicity Value	Gas Mobility Value	Particulate Mobility Value	Toxicity/ Mobility Value
Chlorobenzene	100	1.00E+00	NA	1.00E+02
Toluene	10	1.00E+00	NA	1.00E+01
Trichloroethane, 1,1,1-	10	1.00E+00	NA	1.00E+01

Hazardous Substances Found in an Observed Release

Sample ID	Observed Release Hazardous Substance	Particulate Toxicity/ Mobility Value	Gas Toxicity/ Mobility Value

- N/A and/or data not specified

Documentation for Particulate Mobility:

This information was obtained from Figure 6-3 of Reference 1 on page 51657.

Reference: 1, Figure 6-3

Toxicity/Mobility Value from Source Hazardous Substances:	1.00E+03
Toxicity/Mobility Value from Observed Release Hazardous Substances:	0.00E+00
Toxicity/Mobility Factor:	1.00E+03
Sum of Source Hazardous Waste Quantity Values:	1.88E+05
Hazardous Waste Quantity Factor:	10000
Waste Characteristics Factor Category:	56

Actual Contamination

No.	Sample ID	Distance (miles)	Level of Contamination

- N/A and/or data not specified

Potential Contamination

Distance Categories Subject to Potential Contamination	Population	Value
Onsite	650.0	52.2000
> 0 to 1/4 mile	1500.0	40.8000
> 1/4 to 1/2 mile	1092.0	8.8000
> 1/2 to 1 mile	1518.0	2.6000
> 1 to 2 miles	1031.0	0.8000
> 2 to 3 miles	200.0	0.0400
> 3 to 4 miles	210.0	0.0200
	Potential Contaminantion Factor:	105.0000

Documentation for Population Onsite Distance Category:

According to the IAS and the RFI reports for NWIRP McGregor, the number of people on base is 6500. For the purpose of this calculation for this area affecting the air pathway the number used will be the largest number of persons which could be in a specific area of contamination at any given time. This number is 1,000 people.

Reference: 15,16,36

Documentation for Population > 0 to 1/4 mile Distance Category:

According to the demographics study provided by Environmental Database, Inc., there are approximately 1500 people who live in the quarter mile distance ring. Because the number of people counted in the zero distance ring were those with possible direct contact with the contaminated area, those people were subtracted from the 6500 people known to work on base and these people were added to the people in the distance ring of 0 to 1/4 mile. This assumption was made because of the great distance between the sources on the base and the lack of persons which have a chance to be affected by the contamination.

Reference: 41,36

Documentation for Population > 1/4 to 1/2 mile Distance Category:

According to Environmental Database, Inc., there are 1092 people who live in the quarter to half mile distance ring.

Reference: 41

Documentation for Population > 1/2 to 1 mile Distance Category:

According to Environmental Database, Inc., there are approximately 1518 people who live within the half mile to 1-mile distance ring.

Reference: 41

Documentation for Population > 1 to 2 miles Distance Category:

According to Environmental Database, Inc., there are approximately 1031 people living in the 1 to 2 mile distance ring.

Reference: 41

Documentation for Population > 2 to 3 miles Distance Category:

According to Environmental Database, Inc., there are 200 people living in the 2 to 3 mile distance ring.

Reference: 41

Documentation for Population > 3 to 4 miles Distance Category:

According to Environmental Database, Inc., there are approximately 210 people living in the 3 to 4 mile distance ring.

Reference: 41

Nearest Individual Factor

Level of Contamination: Potential
Distance in miles: 0 to 1/8

Nearest Individual Value: 20

Documentation for Nearest Individual:

There are persons who work onsite and residents who live within the 1/4-mile radius ring.

Reference: 15,16,18

Resources

Resource Use: YES

Resource Value: 5

Documentation for Resources:

Livestock graze on land immediately adjacent to the base.

Reference: 15,16

Actual Contamination, Sensitive Environments

Sensitive Environment	Distance (miles)	Sensitive Environment Value
- N/A and/or data not specified		

Actual Contamination, Wetlands

Distance Category	Wetland Acreage	Wetland Acreage Value
- N/A and/or data not specified		

Sensitive Environments Actual Contamination Factor: 0.000
(Sum of Sensitive Environments + Wetlands Values)

Potential Contamination, Sensitive Environments

Sensitive Environment	Distance (miles)	Sensitive Environment Value	Distance Weight	Weighted Value/10
CROSS-TIMBERS PRAIR	3.800	75	0.0014	0.011
Black-footed Ferret	3.200	75	0.0014	0.011
Sum of Sensitive Environments Weighted Values/10:				0.021

Potential Contamination, Wetlands

Distance Category	Wetland Acreage	Wetland Acreage Value	Distance Weight	Weighted Value/10
> 2 to 3 miles	1.0	25.0	0.0023	0.006
Total Wetland Acreage:	1.0			
Sum of Wetland Weighted Acreage Values/10:				0.006

Sensitive Environment Potential Contamination Factor: 0.027

Documentation for Sensitive Environment CROSS-TIMBERS PRAIR:

This species of prairie timbers is located in this area according to the U. S. Fish and Wildlife Department.

Reference: 34

Documentation for Sensitive Environment Black-footed Ferret:

This species of ferret lives in this area according to the Fish and Wildlife personnel

Reference: 34